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MDFF HELP Library, Version 2: On-Line Documentation for the Map Data Formatting Facility

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The purpose of this report is to describe on-line documentation for the Naval Research Laboratory's Map Data Formatting Facility (MDFF). The MDFF utilizes Digital Equipment Corporation (DEC) computers to process several types of data including Compressed Aeronautical Chart, Compressed Nautical Chart, and Digital Landmass System. Using DEC software utilities, on-line documentation has been developed that provides information pertaining to the processing and compression of these data types and to other topics that are specific to the MDFF.

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MDFF HELP Library Version 2:
On-line Documentation for the Map Data Formatting Facility

INTRODUCTION

The Map Data Formatting Facility (MDFF) utilizes Digital Equipment Corporation (DEC) computer hardware and software in its research and development efforts. This memorandum report assumes that the reader is familiar with the VAX/VMS operating system. A VAX/VMS utility is used to create on-line documentation in the form of a HELP library, which is referred to as the MDFF HELP library because it contains topics that are specific to the MDFF. The intent of the MDFF HELP library is to provide accurate and current information that is readily available, user friendly, and easily maintained. Because the MDFF is a research and development project, continual updates to the MDFF HELP library will be required.

FUNCTIONALITY/REQUIREMENTS

The presentation and recovery of on-line documentation within the MDFF HELP library is functionally similar to the VAX/VMS HELP library. The MDFF HELP library is invoked by using the symbol DEC Control Language (DCL) symbol **MDFFHELP**. **MDFFHELP** is a convenient symbol for simplifying the day-to-day usage of the rather lengthy VAX/VMS librarian command:

```
HELP/LIBRARY = MDFF_SYSTEM:[DOCS_HELP]MDFF.HLB
```

Once the MDFF HELP utility is invoked, alphabetized topics are displayed. Information about a specific topic is made available by entering the name of a topic at the prompt. Main topics currently provided by the MDFF HELP utility are listed in Figure 1. Note that several types of data are processed by the MDFF, including Compressed Aeronautical Chart (CAC), Compressed Nautical Chart (CNC), and Digital Landmass System (DLMS).

Topics pertaining to specific data types are differentiated by using the data type as part of the topic name. For example, the topic named CAC_PROCESSING provides documentation relevant to CAC data processing. Likewise, the CNC_PROCESSING topic provides documentation relevant to CNC data processing. Topic names, though lengthy, are descriptive and follow DEC recommendations for restricting names to upper and lower cases, digits, underscores, and hyphens.

The VAX/VMS library utility is used to create the MDFF HELP library. Individual text files, which contain information pertaining to individual topics, are written according to a specified format and are directly input to the library. For

example, a single text file, which contains information about the topic CAC_PROCESSING, is used to build that portion of the library. By default, text files that are used to build the MDFF HELP library must have the file extension **HLP**.

The VAX/VMS library utility requires the text files to be written in a specific format. Each file must contain key numbers in the first column, followed by the name of the key. Topics that will appear in the initial topic listing, as shown in Figure 1, must use key one. All subtopics use keys two through nine, and consist of a key number followed by the name of the subkey. Figure 2 lists the text file named ARCHIVE.HLP (the first 20 lines) and the format used. The appendices contain listings of current topic files. Appendices A through N contain components of CAC processing and utility software.

CREATION and MAINTENANCE

A DCL command file (Figure 3) is used to invoke the VAX/VMS library utility and to create MDFF HELP. Note that the command file contains two commands: the first command creates the MDFF HELP library, and the second command inserts the topics. Because all topic files have the extension **HLP**, they are automatically inserted into the MDFF HELP library. Presently, this command file is located on the directory MDFF_SYSTEM:[DOCS_HELP] and is named MDFFHELP_REBUILD.COM. The following syntax is used for invocation:

```
@MDFFHELP_REBUILD.COM
```

MDFFHELP_REBUILD.COM is used for adding new topics to MDFF HELP and for modifying existing ones. For inclusion into MDFF HELP, all topic files must reside in the directory MDFF_SYSTEM:[DOCS_HELP].

SUMMARY

On-line documentation for the MDFF is available through the MDFF HELP library. The MDFF HELP library provides information that is readily available, user friendly, and easily maintained. Format requirements for individual topic files are defined. The command file, MDFFHELP_REBUILD.COM, is utilized for proper creation and maintenance.

The MDFF HELP library will require updates in keeping with continuing research and development efforts of the MDFF project.

ACKNOWLEDGMENTS

The MDFF project is funded by the Naval Air Systems Command (NAVAIR), offices of the AV-8B (Program Element 0604214N), F/A-18

(APN), and V-22 (Program Element 0604262N). We thank the following program managers at NAVAIR for their support: Major Randy Siders (AV-8B), CDR Steve Christensen and CDR Chris Cleaver (F/A-18), and CDR Tom Curtis (V-22).

```
HELP

 This HELP LIBRARY is specific to NRL MDFF Laboratory
 topics.  For DEC VAX/VMS topics use the default
 VAX/VMS HELP LIBRARY.


Additional information available:

Acronyms     Archive    Bitmaps     CAC_Processing
CAC_Program_Descriptions  CAC_Source_Code  CNC_Processing
Definitions               DLMS_Processing      HELP   Hints
Logical_Names             Mapstation   Processing_Threads
Symbols
```

Figure 1. MDFF HELP Main Topics

```
1 Archive
  ARCHIVE is a program that is used to display and maintain
  MDFF archive data sets.  MDFF archive data sets serve
  several purposes including:

  * Providing historical research data.
  * Providing examples of significant features.
  * Establishing data sets for base-line testing.
  * Establishing data sets for demonstrations.

2 Overview
  Type the following command to execute ARCHIVE:

      RUN/NODEB MDFFEXE:ARCHIVE

  ARCHIVE is menu driven.  The main menu offers the following
  options (which are described as subtopics).

    VIEW: Displays the archive data set.
    ADD: Adds new data into the ARCHIVE data set.
```

Figure 2. MDFF HELP Library Text File and Format

```
$!*********************************************************
$!                                                        *
$! Command file for building the MDFF HELP Library       *
$!                                                        *
$! Written by:   Stephanie A. Myrick  10/11/91            *
$!                                                        *
$!*********************************************************
$!
$! Recreate MDFF HELP library
$ library/create=(keysize=25)/help mdff_system:[docs_help]mdff
$!
$!
$! Insert all topics - files with HLP extension
$ library/insert/help/log mdff_system:[docs_help]mdff  -
                          mdff_system:[docs_help]*.hlp
```

Figure 3. Command File for Building MDFF HELP

APPENDIX A
TOPIC FILE ACRONYMS.HLP

TOPIC FILE: ACRONYMS.HLP

The following text and subtopics appear when **Acronyms** is selected as an **MDFFHELP** topic:

Acronyms
Acronyms are used throughout the MDFF environment. This topic defines some commonly used acronyms.

Additional information available:

1:2M	1:1M	1:500K	1:250K	1:100K	1:50K
ADRG	AGL	AMSL	AOD	ARC	ASCII
ASWPC	CAC	CD	CDROM	CHUM	CLUT
CN	CNC	CRT	CSVQ	DFAD	DFID
DLMS	DMA	DMAAC	DMS	DR	DTED
ECHUM	EEPROM	EQ	FACS	FIPS	
FIPSPUB	FLIPS	FRC	GLCC	GNC	HTI
ISO	JNC	JOG	KNTC	LCC	MC&G
MDFF	MEF	MO	MOMS	MTE	NOTAM
NP	NT	ODI	ONC	PA	PNTC
RGB	SEC	SP	ST	TLM	TPC
TS	VFR	VFRTA	VQ	WGS	WORM
YMC	ZDR				

The following text comprises this **MDFFHELP** topic file. Note that subtopics begin with the key "2", which is located in column 1.

```
1 Acronyms
    Acronyms are used throughout the MDFF environment. This topic
    defines some commonly used acronyms.

2 1:2M
      1:2,000,000 scale chart.

2 1:1M
      1:1,000,000 scale chart.

2 1:500K
      1:500,000 scale chart.

2 1:250K
      1:250,000 scale chart.
```

2 1:100K
1:100,000 scale chart.

2 1:50K
1:50,000 scale chart.

2 ADRG
ARC Digitized Raster Graphics. A 24 bit scanned chart database that is produced by the Defense Mapping Agency at a resolution of 256 pixels per inch.

2 AGL
Above Ground Level.

2 AMSL
Above Mean Sea Level.

2 AOD
Aircraft Optical Disk. A WORM to which a map-station optical disk image is written. The AOD is used by the Digital Moving Map System onboard tactical aircraft for in-flight navigation.

2 ARC
Equal Arc-Second Raster Chart. A type of Tessellated Spheroid system used to store ADRG data.

2 ASCII
American Standard Code for Information Interchange. A standard for information exchange between equipment produced by different manufacturers.

2 ASWPC
Anti-Submarine Warfare Plotting Charts (1:1,166,614 scale).

2 CAC
Compressed Aeronautical Chart. A 2-bits per pixel version of aeronautical ARC Digitized Raster Graphics, that is stored in Tessellated Spheroid projection for use in mission planning systems and Digital Moving Map Systems. The resolution is 128 pixels per inch.

2 CD
Compact Disk - Read Only Memory. Optical storage media that holds approximately 600 Mbytes.

Also referred to as CD-ROM.

2 CD-ROM
Compact Disk - Read Only Memory. Optical storage media that holds approximately 600 Mbytes.
Also referred to as CD.

2 CHUM

Chart Updating Manual. A semiannual publication that supplies modifications to published aeronautical charts. Additional information is in the DEFINITIONS topic CHUM.

2 CLUT

Color Lookup Table. Used to determine the closest 8-bit color in the color palette for a given 24-bit (red, green, blue) value.

2 CN

Color Normalization. A color preserving technique that is used to build the spatial compression codebook. During CN, compression codewords are selected based on the normalized use of each of the codeword's four colors in the color compressed image.

2 CNC

Compressed Nautical Chart. A 2-bits per pixel version of nautical ADRG, stored in Tessellated Spheroid projection for use in mission planning systems and Digital Moving Map Systems. CNC format is identical to Compressed Aeronautical Chart format. The resolution is 128 pixels per inch.

2 CRT

Cathode Ray Tube. A vacuum tube in which a hot cathode emits electrons that are accelerated as a beam through a relatively high voltage anode, further focused or deflected electrostatically or electromagnetically, and allowed to fall on a fluorescent screen.

2 CSVQ

Color and Spatial Vector Quantization. An iterative technique for locating vector centroids that may be used to color compress and then spatially compress an image.

2 DFAD

Digital Feature Analysis Data. A Defense Mapping Agency database that consists of cultural features (e.g., roads, metropolitan areas, major landmarks).

2 DFID

Digital Flight Information Data. Defense Mapping Agency database.

2 DLMS

Digital Land Mass System. A database consisting of Digital Terrain Elevation Data and Digital Feature Analysis Data.

2 DMA
Defense Mapping Agency. The Defense Department's primary source of digital and analog maps and charts.

2 DMAAC
Defense Mapping Agency Aerospace Center.

2 DMS
Digital Moving Map System. Computer system on board tactical aircraft that displays digital chart data and selected overlays for in-flight navigation.

2 DR
Distribution Rectangle. The minimum bounding rectangle in geographic coordinates encompassing a geographic contiguous set of ADRG image data (that is, the bounding geographic coordinates of the data on the ARC Digitized Raster Graphics CD-ROM).

2 DTED
Digital Terrain Elevation Data. Defense Mapping Agency standard elevation data set in which values are placed every 3 degrees of latitude and longitude.

2 ECHUM
Electronic Chart Updating Manual.

2 EEPROM
Electronic Erasable Programmable Read-Only Memory. Read-Only memory can be erased and reprogrammed as many times as the user desires.

2 EQ
Equatorial (TS zone 2). The region of the earth bounded by an upper latitude of +31.3846 and a lower latitude of -31.3846.

2 FACS
Feature Attribute Coding Standard.

2 FIPS
Federal Information Processing Standards.

2 FIPSPUB
FIPS Publication. A publication released by the FIPS committee.

2 FLIPS
Flight Information Publications.

2 FRC
Fallon Range Chart (1:500K scale).

2 GLCC

Global Loran Navigation and Planning Charts (1:5M scale).

2 GNC

Global Navigation and Planning Charts (1:5M scale).

2 HTI

Horizons Technology, Incorporated. Developer of the Map, Operator, and Maintenance Station (MOMS).

2 ISO

International Standards Organization. An organization formed to define standards. For example, ISO8211 is the standard for transfer of geographic information and ISO9660 is the standard/format for CD-ROM data storage.

2 JNC

Jet Navigation Chart (1:2M scale aeronautical chart).

2 JOG

Joint Operational Graphics (1:250K scale aeronautical chart).

2 KNTC

Korean Navigation Training Chart. This chart is available in two scales:

1:500K scale
1:1M scale

2 LCC

Loran-C Navigational Chart (1:3M scale).

2 MC&G

Mapping, Charting, and Geodesy. Topics within geography. Divisional name of NRL, Code 7440.

2 MDFF

Map Data Formatting Facility. A project within NRL, Code 7441, that performs research, development, testing, and evaluation in the fields of digital map data and image compression.

2 MEF

Maximum Elevation Figure. A value indicating the maximum elevation within a certain area.

2 MO

Magneto-Optical Disk. Storage media used in the operator portion of the Map, Operator and Maintenance Station.

2 MOMS

Map, Operator and Maintenance Station. Developed by HTI.

The Map Station portion is used in the MDFF to produce Aircraft Optical Disks.

The Operator Station portion is used by mission planners and permits addition of overlay data (threats, routes, targets, etc.) to DMS via EEPROM device.

The Maintenance portion is used after flights to evaluate aircraft performance.

2 MTE

Maximum Terrain Elevation. A value indicating the maximum elevation within a certain area.

2 NOTAM

Notice to Airmen.

2 NP

North Polar (TS zone 4). The region of the earth bounded by an upper latitude of +90.0000 and a lower latitude of +51.6923.

2 NT

North Temperate (TS zone 3). The region of the earth bounded by an upper latitude of +51.6923 and a lower latitude of +31.3846.

2 ODI

Optical Disk Image. An image file containing Red, Green, and Blue data (along with related color lookup tables, decompression codebooks, etc.) which resides on codebooks, etc.), which resides on optical disk media (e.g., WORM, MO, CD-ROM).

2 ONC

Operational Navigation Chart (1:1M scale aeronautical chart).

2 PA

Palette. There are 30 standard color palettes in the CAC database. There is one palette for each scale and zone. Each color palette contains 256 colors: 240 colors are used for chart data and the other 16 colors are reserved for geographic overlays.

2 PNTC

Philippines Navigational Training Chart. This chart is available in two scales:

1:500K scale
1:1M scale

2 RGB

Red - Green - Blue. A color scheme often used in color display devices (e.g., color monitors and raster displays).

2 SEC

Sectional Aeronautical Charts (1:500K scale).

2 SP

South Polar (TS zone 0). The region of the earth bounded by an upper latitude of -51.6923 and a lower latitude of -90.0000.

2 ST

South Temperate (TS zone 1). The region of the earth bounded by an upper latitude of -31.3846 and a lower latitude of -51.6923.

2 TLM

Topographic Line Map (1:50K and 1:100K scale aeronautical charts).

2 TPC

Tactical Pilotage Chart (1:500K scale aeronautical chart).

2 TS

Tessellated Spheroid. The map projection system in which the Compressed Aeronautical Chart and the Compressed Nautical Chart are stored.

2 VFR

Visual Flight Rules.

2 VFRTA

Visual Flight Rules Terminal Area Charts (1:250 scale).

2 VQ

Vector Quantization. Lossy compression method used by the MDFF to compress ADRG data.

2 WGS

World Geodetic System. A standard by which the earth's geoid (elliptical shape) is measured.

2 WORM

Write Once, Read Many-times. An optical disk used to store ODIs and intended for use in aircraft Digital Moving Map Systems. A WORM can store approximately 240 Mbytes of chart data on each side.

2 YMC

Yellow-Magenta-Cyan. A color scheme often used by hardcopy devices that deposit colored pigments onto paper (e.g.,

CalComp plotters).

2 ZDR

Zone Distribution Rectangle. An ADRG image for a given ARC zone.

APPENDIX B
TOPIC FILE ARCHIVE.HLP

TOPIC FILE: ARCHIVE.HLP

The following text and subtopics appear when **Archive** is selected as an **MDFFHELP** topic:

```
Archive

Archive is a program that is used to display and maintain MDFF
archive data sets.  MDFF archive data sets serve several
purposes including:

   * Providing historical research data.
   * Providing examples of significant features.
   * Establishing data sets for base-line testing.
   * Establishing data sets for demonstrations.


Additional information available:

Overview   VIEW_Datasets          ADD_Datasets
DELETE_Datasets       END
```

The following text comprises this **MDFFHELP** topic file. Note that subtopics begin with the key "2", which is located in column 1.

```
1 Archive
 Archive is a program that is used to display and maintain MDFF
 archive data sets.  MDFF archive data sets serve several
 purposes including:

    * Providing historical research data.
    * Providing examples of significant features.
    * Establishing data sets for base-line testing.
    * Establishing data sets for demonstrations.


2 Overview

 Type the following command to execute the program:

        RUN/NODEB MDFFEXE:ARCHIVE


 Archive is menu driven.  The main menu offers the following
 options (which are described as subtopics).

    VIEW: Displays the archive data set.
     ADD: Adds new data into the archive data set.
```

DELETE: Deletes data from the archive data sets.
END: Ends (terminates) program execution.

An option is selected by using the arrow keys to highlight the desired option and pressing <CR>.

The following restrictions apply to usage:

* The user must be logged onto a VAXstation running VAX/VWS to VIEW archive data.
* Any computer may be used to ADD or DELETE archive data sets; however, the user must be logged in under the CAC account.

2 VIEW_Datasets

This main menu option is used to display archive data onto a VAX/VWS workstation color monitor. The user must be logged onto a VAXstation running VAX/VWS software in order to view archive data sets.

* A submenu is displayed for data set selection. Submenu options include CAC, CNC, or DLMS data sets (at present, only CAC is implemented).

  To select a CAC data set use the arrow keys to highlight the CAC option and press <CR>.

* Once data set selection is made, another submenu, which requests data type selection, is displayed. Submenu options include:

BAD_CODEBOOK:	Selects data sets compressed using bad or inappropriate codebooks.
DESERT_AREA:	Selects data sets covering desert areas.
DIFF_PALETTE:	Selects data sets using nonstandard color palettes.
END:	Terminates program execution.
HIGH_DISTORTION:	Selects data sets containing high distortion values.
METRO_AREA:	Selects data sets covering metropolitan areas.
MOUNTAIN_AREA:	Selects data sets covering mountain areas.
NOARL_COMPRESSION:	Selects data sets processed using NRL's (formerly the Naval Oceanographic and Atmospheric Research Laboratory, or NOARL) compression method.
PC_ANOMALY:	Selects data sets containing paper chart anomalies (e.g., folds, creases).
PREVIOUS_MENU:	Returns control to the previous menu.
TEST_SET:	Selects test data sets.
WATER_AREA:	Selects data sets covering water areas.

* Once the data type selection is made, another submenu which requests scale and zone selection, is displayed. Options for

every map scale and zone are included (e.g., TLM NP, TPC NT, JNC EQ).

Select the appropriate scale and zone for the desired archive data set by using the arrow keys to highlight and pressing <CR>.

The selected archive data will now be displayed. Type <^Y> or <^C> when finished viewing (this will return you to the last submenu).

Another archive data set may be selected for viewing, or you may select one of the following options:

PREVIOUS_MENU to return to the previous menu
END to end the session.

2 ADD_Datasets

This main menu option adds new data into the archive data set. The user must be logged in with the CAC account in order to use this option. Only compressed data can be added to the archive data set. The addition is performed by copying compressed data from a current processing thread to the archive data set area.

* A submenu is displayed for data set selection. Submenu options include CAC, CNC, or DLMS data sets (at present, only CAC is implemented).

  To select a CAC data set use the arrow keys to highlight the CAC option and press <CR>.

* Once data set selection is made, another submenu which requests data type selection is displayed. Submenu options include:

BAD_CODEBOOK:	Selects data sets compressed using bad or inappropriate codebooks.
DESERT_AREA:	Selects data sets covering desert areas.
DIFF_PALETTE:	Selects data sets using nonstandard color palettes.
END:	Terminates program execution.
HIGH_DISTORTION:	Selects data sets containing high distortion values.
METRO_AREA:	Selects data sets covering metropolitan areas.
MOUNTAIN_AREA:	Selects data sets covering mountain areas.
NOARL_COMPRESSION:	Selects data sets processed using NRL's (formerly the Naval Oceanographic and Atmospheric Research Laboratory, or NOARL) compression method.
PC_ANOMALY:	Selects data sets containing paper chart anomalies (e.g., folds, creases).
PREVIOUS_MENU:	Returns control to the previous menu.
TEST_SET:	Selects test data sets.
WATER_AREA:	Selects data sets covering water areas.

* Once the data type selection is made, another submenu which requests scale and zone selection, is displayed. Options for every map scale and zone are included (e.g., TLM NP, TPC NT, JNC EQ).

  Select the appropriate scale and zone for the desired archive data set by using the arrow keys to highlight and pressing <CR>.

* Specify the input processing thread (e.g., A5B), color palette number (e.g., 133), and lower left-hand row/column numbers of the data to be added.

  Addition takes about 1 minute, then the prompt returns to the last submenu.

2 DELETE_Datasets

This menu option is used to delete data from the archive data set. The user must be logged in with the CAC account in order to use this option.

* A submenu is displayed for data set selection. Submenu options include CAC, CNC, or DLMS data sets (at present, only CAC is implemented).

  To select a CAC data set use the arrow keys to highlight the CAC option and press <CR>.

* Once data set selection is made, another submenu, which requests data type selection, is displayed. Sub_menu options include:

BAD_CODEBOOK:	Selects data sets compressed using bad or inappropriate codebooks.
DESERT_AREA:	Selects data sets covering desert areas.
DIFF_PALETTE:	Selects data sets using nonstandard color palettes.
END:	Terminates program execution.
HIGH_DISTORTION:	Selects data sets containing high distortion values.
METRO_AREA:	Selects data sets covering metropolitan areas.
MOUNTAIN_AREA:	Selects data sets covering mountain areas.
NOARL_COMPRESSION:	Selects data sets processed using NRL's (formerly the Naval Oceanographic and Atmospheric Research Laboratory, or NOARL) compression method.
PC_ANOMALY:	Selects data sets containing paper chart anomalies (e.g., folds, creases).
PREVIOUS_MENU:	Returns control to the previous menu.
TEST_SET:	Selects test data sets.
WATER_AREA:	Selects data sets covering water areas.

* Once the data type selection is made, another submenu which requests scale and zone selection, is displayed. Options for every map scale and zone are included (e.g., TLM NP, TPC NT, JNC EQ).

  Select the appropriate scale and zone for the desired archive data set by using the arrow keys to highlight and pressing <CR>.

* A prompt will ask if you are sure you want to delete a dataset. The data will be deleted when "Yes" is entered, otherwise the data will NOT be deleted.

  Control returns to the last submenu.

2 END
Terminates program execution.

APPENDIX C
TOPIC FILE BITMAPS.HLP

TOPIC FILE: BITMAPS.HLP

The following text and subtopics appear when **Bitmaps** is selected as an **MDFFHELP** topic:

```
Bitmaps

Bitmaps are used by certain programs within the MDFF software
suite.  All bitmap files are stored in the directory
MDFF_SYSTEM:[BITMAPS] and have the same format.

The Bitmap format uses the first 16 bytes (first 4 longwords)
to contain the minrow, mincol, maxrow, and maxcol
of the data that are being described.  All remaining bytes
contain the actual 1 and 0 values.


Additional information available:

File_Names Summary_Files
```

The following text comprises this **MDFFHELP** topic file. Note that subtopics begin with the key "2", which is located in column 1.

```
1 Bitmaps
 Bitmaps are used by certain programs within the MDFF software
 suite.  All bitmap files are stored in the directory
 MDFF_SYSTEM:[BITMAPS] and have the same format.

 Bitmap format uses the first 16 bytes (first 4 longwords)
 to contain the minrow, mincol, maxrow, and maxcol
 of the data that are being described.  All remaining bytes
 contain the actual 1 and 0 values.

2 File_Names
 The file naming convention for the different types of bitmaps are
 as follows:

   Type:  CAC Bitmaps

   Name:  a_b_c.TEMPLATE;d

   where
          a = CD_ID          Extracted from the CAC CD-ROM

          b = SCALE          Chart scale
```

c = ZONE 0-4 possible TS zones

d = VERSION VAX/VMS file version number

Example: CD-1991-A-MAP2-10007_2_3.TEMPLATE;1

Type: Generic Bitmaps

Name: a_b_c.TEMPLATE;d

where

a = Bitmap name Determined by the user

b = SCALE Chart scale

c = ZONE 0-4 possible TS zones

d = VERSION VAX/VMS file version number

Example: MY_BITMAP_2_2.TEMPLATE;1

Type: AOD Template Bitmaps

Name: a_b_c_d.TEMPLATE_e;f

where

a = AOD name Determined by the user

b = SIDE A, B, or C possible sides
(Note: Side C denotes both side A and B)

c = SCALE Chart scale

d = ZONE 0-4 possible TS zones

e = Subdir Number 1-3 possible subdirectories

f = VERSION VAX/VMS file version number

Example: ALASKAN_A_3_4.TEMPLATE_1;1

2 Summary_Files

Also contained in the MDFF_SYSTEM:[BITMAPS] directory are the AOD template summary files. These files contain, in ASCII format, information about a given AOD's template.

The file naming convention for these summary files are as follows:

Type: AOD template summary files (ASCII File)

Name: a.LIS;b
where

a = AOD name	Determined by the user (usually the same name as the AOD being summarized)
b = VERSION	VAX/VMS file version number

EXAMPLE: ALASKAN.LIS;1

APPENDIX D
TOPIC FILE CAC_PROCESSING.HLP

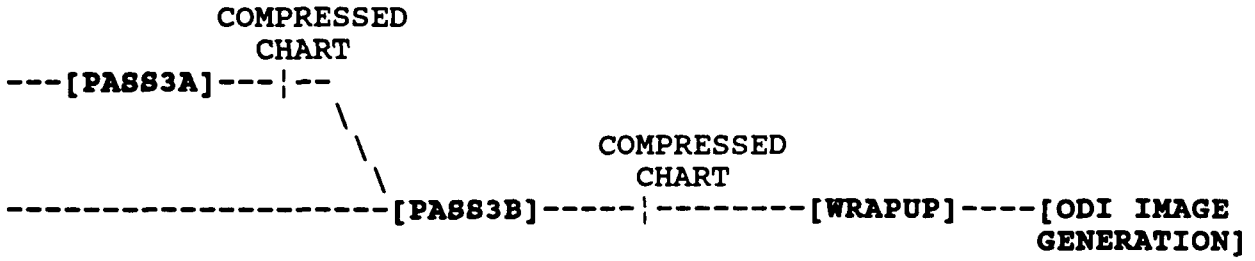
TOPIC FILE: CAC_PROCESSING.HLP

The following text and subtopics appear when **CAC_Processing** is selected as an **MDFFHELP** topic:

```
CAC_Processing

This topic covers the processing of CAC data.  Both the CAC
and CNC have the same source data format, ADRG. Thus, their
processing steps are very similar.

See the CNC_Specifics topic for CNC specific information.

Additional information available:

Overview    INITIALIZATION        PASS1       PASS2     PASS3A
PASS3B      WRAPUP      BUILD_ISO_IMAGE       Display_Programs
Segment_Files           Status_Files
```

The following text comprises this **MDFFHELP** topic file. Note that subtopics begin with the key "2", which is located in column 1.

```
1 CAC_Processing

    This topic covers the processing of CAC data.  Both the CAC and
    the CNC have the same source data format, ADRG. Thus, their
    processing steps are very similar.

    See the CNC_Specifics topic for CNC specific information.

2 Overview

    Interfacing with CAC processing is conducted through the
    user interface CHART_CONTROL.  CHART_CONTROL sets control
    information in various status files (see Status_Files) that is
    in turn interpreted by the PROCESS_CHART program.

    A general overview of the processing steps is shown below:

                                      COMPRESSED CHART
                                      CORE
                                     /
INITIALIZATION---ADRG--[PASS1]--                  FILLED SEGMENTS -----
                                     \           /
                                      EDGE --[PASS2]--
                                                  \
                                            UNFILLED SEGMENTS -----
```



2 INITIALIZATION

Beginning with the CHART_CONTROL INIT_BUILD option, a process thread is created, logical names are built, and the generic processing queue is established.

2 PASS1

Beginning with the CHART_ODI START_PASS1 option, PASS1 attempts to build codebook procedures and to compress all CORE segments.

CHART_ODI options SELECT_READERS and VALIDATE_READERS are used to begin processing ADRG data from CD-ROM for inclusion into a CAC.

2 PASS2

Beginning with the CHART_ODI START_PASS2 option, PASS2 attempts to fill remaining UNFILLED EDGE segments. Due to lack of data, it may not be possible to fill all EDGE segments. UNFILLED segments are compressed in PASS3B.

CHART_ODI options SELECT_READERS and VALIDATE_READERS are used for reading ADRG data from CD-ROM.

2 PASS3A

Beginning with the CHART_ODI START_PASS3 option, PASS3 builds codebooks for and compresses FILLED segments from PASS2 (or PASS1 when PASS2 in not performed).

2 PASS3B

Compresses failed codebook segments from PASS3A and any remaining UNFILLED segments (e.g. outer EDGE segments). There are CHART_ODI options for chart build processing to pause, stop, resume, and recover.

2 WRAPUP

Determines palette boundaries, and creates CD Coverage, Palette Coverage, Area Source, and Area DR files. Deletes extraneous files.

CHART_CONTROL option START_CHART_WRAPUP performs these actions.

2 BUILD_ISO_IMAGE

Creates an ISO 9660 Image from applicable files. CHART_CONTROL option START_ISO_IMAGE_BUILD performs this action.

After generation, the ISO 9660 image is copied to magnetic tape and sent to the mastering facility (to be produced as a CD-ROM). The command file that performs tape initialization and file copy is located at and named

MDFFEXE:CHART_ISO_IMAGE_TO_TAPE.COM

2 Display_Programs

Programs are available for displaying data on workstations (VAX/VWS, VAX/GPX, and IVAS) and hardcopy devices. These programs are described in the CAC_PROGRAM_DESCRIPTIONS topic.

2 Segment_Files

Naming conventions for downsampled and compressed files have been established. Each convention is described as a subtopic.

3 Downsampled_Segments

Downsampled segment files use the following naming convention:

directory:[Rsnnnnn]12345678.90z

The "directory" will usually be "CHART_SEGMENTS".

For codebook repair, the string "directory:["
is replaced by the string "MDFF_SCRATCH:[CB_REPAIR."

Note the placement of the periods and brackets, they are significant!

The "s" is the sign of the row number. "0" for positive,
"1" for negative.

The "nnnnn" is the row number to five whole digits.

The "12345678" is the first eight digits of the key name,

which is computed from the row and column numbers.

The "90" is the last two digits of the key name computed from the row and column numbers.

The "z" is the TS zone number (0 through 4).

4 Examples
For a downsampled segment on row 130 and column -378 in the equatorial zone (TS zone 2):

The segment is stored in the current processing thread's area for downsampled data with directory and file names:

CHART_SEGMENTS:[R000130]01552137.532

The segment is stored in the current processing thread's area for codebook repair with directory and file names:

MDFF_SCRATCH:[CB_REPAIR.R000130]01552137.532

3 Compressed_Segments
Compressed segment files use the following naming convention:

CHART_ODI_DISK:[MAPx.PAkkkkmm.Rsnnnnn]12345678.90z

For codebook repair, the string "CHART_ODI_DISK:[MAPx.PAkkkkmm." is replaced by the string "MDFF_SCRATCH:[CB_REPAIR."

Note the placement of the periods and brackets, they are significant!

The "x" is the TS scale (0 through 5).

The "kkkk" is the palette (i.e., PA) number of the palette used to compress this data.

The "mm" is an arbitrary sequence number assigned to each palette subdirectory. The order is dependent on the order that the palette subdirectories are created (ie. first: 01, second: 02, third: 03, and so on).

The "s", "nnnnn", "12345678", "90" and the "z" are the same as the downsampled filenames.

4 Examples
For a compressed segment on row 130 and column -378 in the equatorial zone (TS zone 2):

The data is stored in the current processing thread's area for compressed data with directory and file names:

CHART_ODI_DISK:[MAP3.PA013001.R000130]01552137.532

The data is stored in the current processing thread's area for codebook repair with directory and file names:

MDFF_SCRATCH:[CB_REPAIR.R000130]01552137.532

2 Status_Files

Status files are used to provide current information about CD-ROM readers and CAC processing.

The availability of CD-ROM readers is provided through the file CDREADER_STATUS.DAT.

The various stages of CAC processing are controlled by the status files: CHART_STATUS.DAT and CODEBOOK_STATUS.DAT.

The CHART_STATUS.DAT file is the master control file. It contains a header record and one status record for each ADRG CD-ROM input for processing.

A CODEBOOK_STATUS.DAT file is used to log information pertaining to the codebook build/compression phase of PASS1 and PASS3A. There is one of these for each ADRG CD-ROM and one for each PA processed in PASS3A.

3 CDREADER_STATUS

This file resides in the MDFF_SYSTEM:[DATA] directory and is accessed through the SHOW_CDREADER_STATUS utility. Updates are

made when one of the following statements is true:

A CD reader is mounted using the MOUNT_CDROM utility
A CD reader is dismounted using the DISMOUNT_CDROM utility

For proper operation and maintenance, it is imperative that the MOUNT_CDROM and DISMOUNT_CDROM utilities be used.

3 CHART_STATUS

This file resides in the MDFF_SCRATCH:[000000] directory for the current processing thread. The file format is described in the file MDFFEXE:CHART_STATUS.INC.

4 Header_Record

These are the mnemonics, with their values, for fields in the header record which are used to control CAC processing.

Values for "PROCESSING_STATE":

NO_OP	0
INITIALIZING_BUILD	1
PASS1_IN_PROGRESS	2
PASS2_IN_PROGRESS	3
BUILDING_SEGMENT_LISTS	4
BUILDING_PASS3A_PROCS	5
BUILDING_PASS3A_CBS	6
BUILDING_PASS3B_PROC	7
COMPRESSING_PASS3B_SEGMENTS	8
BUILDING_ID_DIR_FILES	9
BUILDING_CHART_ISO_IMAGE	10

Values for "LAST_PHASE_COMPLETED":

NO_OP	0
BUILD_INITIALIZED	1
PASS1_COMPLETE	2
PASS2_COMPLETE	3
SEGMENT_LISTS_BUILT	4
PASS3A_PROCS_BUILT	5
PASS3A_CBS_COMPLETED	6
PASS3B_PROC_BUILT	7
PASS3B_SEGMENTS_COMPRESSED	8
ID_DIR_FILES_BUILT	9
CHART_ISO_IMAGE_BUILT	10
CHART_BUILD_COMPLETE	11

Values for "CONTROL":

NO_OP	0
CHART_BUILD_INIT	1
CHART_BUILD_PASS1	2
CHART_BUILD_PASS2	3
CHART_BUILD_PASS3	4
CHART_BUILD_PASS3_CONT	5
CHART_BUILD_WRAPUP	6
CHART_BUILD_ISO_IMAGE	7
CHART_BUILD_RESUME	8
CHART_BUILD_PAUSE	9

4 Status_Record

These are the mnemonics, with their values, for fields in the header record which are used to control CAC processing.

Values for "PROCESSING_STATE":

NO_OP	0
READING_ADRG	1
DOWNSAMPLING_ADRG	2
BUILDING_ADRG_CB_PROCS	3
SUBMITTING_ADRG_CB_PROCS	4
BUILDING_ADRG_CBS	5

Values for "LAST_COMPLETED_PHASE:

NO_OP	0
ADRG_READ	1
ADRG_DOWNSAMPLED	2
ADRG_CB_PROCS_BUILT	3
ADRG_CB_PROCS_SUBMITTED	4
ADRG_CBS_BUILT	5
CD_COMPLETE	6
TO_BE_REPROCESSED	7

Values for "LEGEND_STATUS":

NO_OP	0
LEGEND_START	1
LEGEND_PROCESSING	2
LEGEND_FINISHED	3
LEGEND_COMPLETE	4

3 CODEBOOK_STATUS

This file resides in the MDFF_SCRATCH:[CDmnnnnn] directory for the "nnnnn" ADRG CD-ROM being processed. The file format is described in the file MDFFEXE:CODEBOOK_STATUS.INC.

APPENDIX E
TOPIC FILE CAC_PROGRAM_DESCRIPTIONS.HLP

TOPIC FILE: CAC_PROGRAM_DESCRIPTIONS.HLP

The following text and subtopics appear when **CAC_Program_Descriptions** is selected as an **MDFFHELP** topic:

```
CAC_Program_Descriptions

  This topic contains functional descriptions of executable
  images.  All executable images are located in the directory
  named MDFFEXE.

  For more detailed information about these programs, see
  topic  CAC_SOURCE_CODE.

  Additional information available:

  Overview   ALGEBRAIC_REMAP        ALG_PAL_BUILD_DRIVER
  BUILD_PASS1_PROCEDURES            BUILD_PASS3A_PROCEDURES
  BUILD_PASS3B_PROCEDURES           CB_REPAIR_IVAS
  CHART_CONTROL          CHECK_CDREADER_STATUS_DRIVER
  CLEAR_CDREADER_STATUS_DRIVER  DECODEKEY DELETE_PA_DIR_DRIVER
  Display_Programs       DOWNSAMPLE_CD          DS_SEGS
  DUMP_CODEBOOK_STATUS  DUMP_COLPAL_DB          DUMP_DS_SEGMENTS
  ENCODEKEY  FIND_CD_STATUS         LIST_CHART_STATUS
  PROCESS_CHART     READ_ADRG_DATA         SHOW_CDREADER_STATUS
  TEK         TRIM_ODI_STRUCT
```

The following text comprises this **MDFFHELP** topic file. Note that subtopics begin with the key "2", which is located in column 1.

```
1 CAC_Program_Descriptions
    This topic contains functional descriptions of executable
    images.  All executable images are located in the directory
    named MDFFEXE.

    For more detailed information about these programs, see
    topic  CAC_SOURCE_CODE.

2 Overview
    A variety of executable images are used in CAC data processing.
    Brief functional descriptions of these images follow.

            ALGEBRAIC_REMAP: Uses a given CAC color palette and
                             individual RGB shades to produce
                             an algebraic color palette.

        ALG_PAL_BUILD_DRIVER: Builds algebraic palettes for very
```

large scale data.

BUILD_PASS1_PROCEDURES: Builds command files for codebook generation/data compression.

BUILD_PASS3A_PROCEDURES: Builds command files for FILLED segment codebook/compressions.

BUILD_PASS3B_PROCEDURES: Builds command file for UNFILLED segment compression and for failed PASS3A codebook compressions.

CB_REPAIR_IVAS: Repairs segments using the appropriate compression method (Honeywell or NRL) and the IVAS monitor for display.

CHART_CONTROL: User interface to CHART ODI processing.

CHECK_CDREADER_STATUS_DRIVER: Checks the availability of a CD-ROM reader. Is used by the MOUNT_CDROM utility

CLEAR_CDREADER_STATUS_DRIVER: Clears the status of a CD-ROM reader to make the reader available for use. Is used by the DISMOUNT_CDROM utility.

DECODEKEY: Decodes a segment key into a set of row/column numbers.

DELETE_PA_DIR_DRIVER: Deletes an entire palette (PA) directory, for specific TS zone.

Display_Programs: A suite of programs is available for displaying data on workstations and hardcopy devices.

DOWNSAMPLE_CD: Converts input ADRG data from the ARC projection system to the TS projection system.

DS_SEGS: Downsamples TS segments from ADRG data that are stored on CD-ROM.

DUMP_CODEBOOK_STATUS: Lists information about the codebooks for a specific CD-ROM or palette.

DUMP_COLPAL_DB: Lists information about each color palette.

DUMP_DS_SEGMENTS: Lists information about the downsampled segments of a CD.

ENCODEKEY: Encodes a set of row/column numbers into a key, which is used to name a segment file.

FIND_CD_STATUS: Checks all processing threads for the UNAVAILABILITY of CD-ROM readers.

LIST_CHART_STATUS: Lists contents of the current or specified processing thread's CHART_STATUS file.

PROCESS_CHART: Used as a continuing process that monitors and maintains CHART ODI processing.

READ_ADRG_DATA: Copies ADRG data from CD-ROM to magnetic disk.

SHOW_CDREADER_STATUS: Displays the status of CD-ROM readers, availability and owner process names (for unavailable readers). Used by the SHOW_CDREADER_STATUS utility.

TEK: Prints file with extensions TEK and IMAGE on the TEKTRONIX printer.

TRIM_ODI_STRUCT: Moves designated compressed and downsampled segments from a specified processing thread into a trim directory.

2 ALCEBRAIC_REMAP

Takes a CAC color palette (e.g., MDFF_SYSTEM:[COLPAL]PA0xxx.PALETTE) that has been supplied as input and applies individual RGB shade levels to remap the CAC palette's colors into the closest corresponding algebraic values. The RGB shade levels (e.g. red=8, green=6, blue=5 ==> 8x6x5 = 240 colors) are used to divide RGB space into small cubes. The centroid value of each cube is then compared with the input palette's values. The closest centroid value (in euclidean distance) replaces each input palette color.

This program is used for remapping CAC palettes into lower color levels. For example, entering RGB shades of 4,4,4 will remap a 240 entry color palette into 64 colors. The output palette can then be used to display CAC data at this lower color resolution.

ALGEBRAIC_REMAP is invoked using the following syntax:

```
$ RUN/NODEB V2_DIR:ALGEBRAIC_REMAP
```

3 Input

ALGEBRAIC_REMAP issues the following input prompts.

CAC palette disk name	Enter the symbol or name of the device containing the input CAC palette file. For example, MDFF_SYSTEM
CAC directory path	Enter the symbol or directory path for the directory containing the input CAC palette file. Brackets must not be included. For example, COLPAL
Palette filename	Enter the CAC palette file name. For example, PA0xxx.PALETTE where xxx is a palette ID number.

The following prompts are used to obtain RGB shade levels. Note that RxGxB input values cannot exceed 240 (i.e., only 240 possible colors can be created).

Red shades	Enter an integer to represent a RED shade
Green shades	Enter an integer to represent a GREEN shade.
Blue shades	Enter an integer to represent a BLUE shade.

The user is also prompted for an output path name and names for the output (algebraic) colormap, palette, and color conversion files.

Output disk name	Enter the symbol or name of the device to contain the output files. For example, MDFF_SYSTEM
Output directory path	Enter the symbol or directory path for the directory to contain the output files. Brackets must not be included. For example, COLPAL
Algebraic palette filename	Enter the algebraic palette file name using the CAC palette format. For example, PA0xxx.PALETTE where xxx is a palette ID number.
Algebraic colormap filename	Enter the algebraic colormap file name

using the CAC colormap format and .DAT extension. For example, PA0xxx.DAT where xxx is a palette ID number.

Color conversion filename — Enter the conversion file name using using the CAC colormap format and .CNV extension. For example, PA0xxx.CNV where xxx is a palette ID number. This file is used to remap 24-bit color values to 8 bit.

3 Output

Program output consists of the following files, each of which is written on the device and directory that were specified as program input.

Algebraic palette file — The algebraic palette file name uses the CAC palette format. For example, PA0xxx.PALETTE where xxx is a palette ID number.

Algebraic colormap file — The algebraic colormap file name uses the CAC colormap format and .DAT extension. For example, PA0xxx.DAT where xxx is a palette ID number.

Color conversion file — The conversion file name using the CAC colormap format and .CNV extension. For example, PA0xxx.CNV where xxx is a palette ID number. This file was used to remap 24-bit color values to 8 bit.

2 ALG_PAL_BUILD_DRIVER

This program is used to build algebraic palettes for very large scale data sets where standard color palette builds are impractical. Familiarity with color mechanics and RGB space is assumed.

The algebraic palette that is built is based on RGB shade levels that are supplied as program input. For example, using inputs where Red=8, Green=6, and Blue=5, will produce (8 x 6 x 5), or 240 distinct colors. The shade levels are used to divide RGB space into small "boxes," where the centroid value of each box is used as a color palette entry.

The length of each box on an axis of RGB space is computed using each shade level where:

box length = (total number of colors) / shade level

Hence, box length in RGB space for the red axis = 256/8; for the green axis = 256/6; and for the blue axis = 256/5.

The centroid value is simply half the value of the length of the box in RGB space. Hence,

the red axis = (256/8) / 2 = 16
the green axis = (256/6) / 2 = 21
the blue axis = (256/5) / 2 = 26

3 Input

The following prompts are used to obtain RGB shade levels. Note that (Red x Green x Blue) input shade levels cannot exceed 240 (i.e., only 240 colors can be created).

Red shade	Enter an integer to represent a RED shade level.
Green shade	Enter an integer to represent a GREEN shade level.
Blue shade	Enter an integer to represent a BLUE shade level.

The user is also prompted for an output device name, path name and names for the algebraic palette, colormap, and color conversion files.

Output disk name	Enter the symbol or name of the device to contain the output files. For example, MDFF_SYSTEM
Output directory path	Enter the symbol or directory path for the directory to contain the output files. For example, COLPAL
Algebraic palette filename	Enter the algebraic palette file name using the CAC palette format. For example, PA0xxx.PALETTE where xxx is a palette ID number.
Algebraic colormap filename	Enter the algebraic colormap file name using the CAC colormap format and .DAT extension. For example, PA0xxx.DAT where xxx is a palette ID number.
Color conversion filename	Enter the conversion file name using using the CAC colormap format and .CNV extension. For example, PA0xxx.CNV where xxx is a palette ID number. This file is used to remap 24-bit color values to 8 bit.

3 Output
Program output consists of the following files: the algebraic palette, algebraic colormap, and a color conversion file. Each of these files is described below.

Algebraic palette file	The algebraic palette file name uses the CAC palette format. For example, PA0xxx.PALETTE where xxx is a palette ID number.
Algebraic colormap file	The algebraic colormap file name using the CAC colormap format and .DAT extension. For example, PA0xxx.DAT where xxx is a palette ID number.
Color conversion file	The conversion file name using using the CAC colormap format and .CNV extension. For example, PA0xxx.CNV where xxx is a palette ID number. This file is used to remap 24-bit color values to 8 bit.

These output files are stored in binary format and may be read using the "C" functions that are located in CAC_UTILS.C: READ_PALETTE.C, READ_COLORMAP.C, and READ_COLOR_CONVERSION.C.

2 BUILD_PASS1_PROCEDURES
Constructs PASS1 codebook build/compression procedures for CORE segments and creates/modifies the related Codebook_Status file. The Codebook_Status File contains an entry for every build request that was generated. Codebooks are generated using 9 of 25 CORE segments.

2 BUILD_PASS3A_PROCEDURES
Constructs PASS3A codebook build/compression procedures for FILLED (EDGE) segments and creates/modifies the related Codebook_Status File. The Codebook_Status File contains an entry for every build request that was generated.

Builds PA codebooks using nine (of nine) segments.

2 BUILD_PASS3B_PROCEDURES
Constructs all codebook build/compression procedures for UNFILLED (EDGE) segments and for failed PASS3A codebook compressions.

Uses the nearest segment's codebook method for compression.

2 CB_REPAIR_IVAS
Determines the compression type of the data to be repaired and,

using the appropriate compression method, repairs it. The two compression methods are Honeywell and NRL.

Bad segments are identified during the review process and are downsampled into the CB_REPAIR area for repair. CB_REPAIR_IVAS displays the bad segment on the IVAS monitor and uses a codebook, from a preselected segment, to again (via appropriate method) compress the downsampled data. The result is displayed, and if acceptable, written to the CHART_ODI_DISK area replacing the bad segment.

3 Input_Output

The following inputs are required during program execution:

```
Enter the chart scale (0,1,2,3,4,5)
Enter the zone (0,1,2,3,4)
Enter the palette number
Enter CD number
Enter the row and column number (of the segment) to repair
Enter the row and column (of a segment) to use for a
codebook
Does image pass (Y/N)?
```

Outputs: If the newly compressed segment image is acceptable, it is written to the CHART_ODI_DISK area and is used to replace the previous bad segment.

3 Required_Subroutines

The following routines are required for program execution.

CB_REPAIR_IVAS:	Driver program for repair subroutines.
H_CB_REPAIR:	Honeywell compression repair module.
N_CB_REPAIR:	NRL compression repair module.
READER:	Module to read a downsampled data file.
COMPRESS_SEG_NOARL:	Module to compress a segment via NRL compression.
GET_CAC_DATA_24_BIT:	Module to read 1 CAC segment and decompress it to 24 bits.
GET_INFO:	Module in NRL compression to prompt user for input.
MAKE_DS_NAMES:	Module to make the downsampled file names for the READER module.
GET_DS_DATA:	Module to get 24-bit downsampled data.
PUT_IMAGE:	Module to put a 256 x 256 image onto the IVAS screen.
MAKE_ODI_SEGNAME:	Module to make the CHART_ODI_DISK segment name.
GET_CODEBOOK:	Module to get and decompress a segment codebook.
DISPLAY_CODEBOOK:	Module to display a codebook on the IVAS monitor.
UNPACK_CAC:	Module to unpack or decompress a CAC

segment.

PRINTIO: Module to print a image on the TEKTRONIX printer.

NOARL_TEKPRINT: Translation driver for the TEKTRONIX printer.

2 CHART_CONTROL

The CHART_CONTROL program is the main user interface for Version 2 CAC processing. This is a menu driven program. To select a function, use the arrow keys to highlight the desired function, then hit <CR>. To exit a menu (function) with no action taken, type <CTRL_Z>.

FUNCTION	ACTION
START_PASS1	Enables the processing of ADRG CD-ROMs for PASS1.
START_PASS2	Enables the processing of ADRG CD-ROMs for PASS2.
START_PASS3	Begins PASS3 processing phase. Builds the following files: UNFILLED_SEGMENTS.DAT, FILLED_SEGMENTS.DAT, and SEGMENTS.DAT. A mail message is sent to notify operators that the program DISPLAY_SEGMENTS must be run in order to check the validity of these files.
CONT_PASS3	Continues PASS3 processing by building and submitting codebook build/compression procedures for FILLED segments (PASS3A). Finally, UNFILLED segments and those segments remaining after PASS3A, are compressed using nearest segment's codebooks (PASS3B).
CHART_WRAPUP	Builds [ID] directory files and adds ODI information (i.e., inventory of processed ADRG CDs used to build the CAC) to the file named MDFF.DBASE.
SELECT_READERS	Select the previously validated ADRG CD-ROM(s) for processing. This phase adds the selected CD-ROM(s) to the CHART_STATUS database.
VALIDATE_READERS	Validate the input ADRG CD-ROM(s). Ensure that the CD-ROM is the right scale and area for inclusion into the current build. This phase only displays the CD-ROM contents. No

action is taken on the validated CD-ROM, the option SELECT_READERS adds this data.

RECOVER_BUILD — Recovers interrupted processing. For phases PASS1 and PASS3, CHART_STATUS entries in downsampling phase can be started either "cold" (i.e., from the very beginning) or "warm" (i.e., from where processing was prior to the interruption). CHART_STATUS entries previously submitted for building codebooks are resubmitted to processing queues as are entries that were not successfully completed prior to the interrupt.

MISCELLANEOUS — Miscellaneous functions to modify the CHART_STATUS database for the current build.

PAUSE_BUILD — Pauses CHART processing for the currently selected processing thread.

RESUME_BUILD — Resumes CHART processing for the currently selected processing thread.

INIT_BUILD — Initialize the CHART processing system for an ODI build.

STOP_BUILD — Stops CHART processing for the currently selected processing thread.

2 CHECK_CDREADER_STATUS_DRIVER

This program checks and updates the availability of a CD-ROM reader. It is executed through the MOUNT_CDROM DCL symbol.

MOUNT_CDROM executes a command file, named MOUNT_CDROM.COM, which invokes CHECK_CDREADER_STATUS_DRIVER.

The CDREADER_STATUS file contains an availability status for each CD-ROM reader. The MOUNT_CDROM utility checks CD-ROM reader availability by reading the CDREADER_STATUS file. If a specified CD-ROM reader is available for use, the CD-ROM reader is allocated and mounted and the status in CHART_STATUS is updated to show the reader as being unavailable for use. Therefore, it is imperative that the MOUNT_CDROM utility be used for allocating and mounting CD-ROM readers.

Note: CD-ROM readers may be mounted as being a FOREIGN device or an ISO image.

2 CLEAR_CDREADER_STATUS_DRIVER

This program clears the status of a CD-ROM reader (i.e., showing the reader as being available for use) and is executed

through the DISMOUNT_CDROM DCL symbol.

DISMOUNT_CDROM executes a command file, DISMOUNT_CDROM.COM which invokes CLEAR_CDREADER_STATUS_DRIVER.

The CDREADER_STATUS file contains an availability status for each CD-ROM reader. The DISMOUNT_CDROM utility updates the

CDREADER_STATUS file to reflect changes in CD-ROM reader availability. Therefore, it is imperative that DISMOUNT_CDROM utility be used for dismounting and deallocating CD-ROM readers.

2 DECODEKEY

This program prompts for a segment's key. This key is decoded to row and column numbers that are displayed as output. Row and Column numbers are computed as follows:

```
row = mod [(key - 162018001),18001]
col = [(key - 162018001) - row / 18001]
```

2 DELETE_PA_DIR_DRIVER

Deletes an entire PA Directory, determined by the zone, for a specific processing thread. Perform the following steps to execute, the program:

* Set the processing thread for the data to be deleted.
* Type the command RUN/NODEB MDFFEXE:DELETE_PA_DIR_DRIVER

A message is displayed that advises the user to ascertain that the current processing thread is the proper processing thread for data deletion.

NOTE: ** This is very important - If the wrong processing thread is set, the wrong data could be deleted. **

The user is then prompted for the zone of the data to be deleted. All compressed segment data, contained within that zone, are deleted. In addition, the PA directory and all underlying subdirectories are deleted.

2 Display_Programs

This suite of programs displays data on a variety of devices.

3 Overview

This suite of programs displays data on a variety of devices. Hence, device names are usually included as part of the program name. Programs that display data on the International Imaging Systems image processor, IVAS, include the name IVAS. Programs

that display data on a DEC VAXstation monitor, running VAX Workstation Software (VWS), include the name VWS.

DISPLAY_ADRG_IVAS: Displays ADRG data on the IVAS. Data are usually read from CD-ROM.

DISPLAY_CAC_IVAS: Displays compressed segments on the IVAS. Data are read from the CHART_ODI_DISK:

DISPLAY_CAC_PORTABLE: X-windows/MOTIF version of DISPLAY_CAC that is portable to VAX/VMS systems.

DISPLAY_CAC_VWS: Displays compressed segments on a DEC VAXstation running VWS.

MAPSTATION_DRIVER: Displays the area of coverage, for a mapstation subdirectory, on a DEC VAXstation running VWS.
A CalComp plot file, showing the area of coverage, may also be created.

PLOT_CDS_VWS: Displays downsampled segments from ADRG CDs with each segment represented by a rectangle.

PLOT_ODI: Plots the area of a chart ODI build. Enables the addition and/or deletion of selected charts to the ODI build.

3 DISPLAY_ADRG_IVAS

This program is used to view ADRG data from CD-ROM on the IVAS color monitor. The ADRG CD-ROM can be treated as a hard disk with the exception that files cannot be deleted or created (as it is mounted READONLY). Because the CD-ROM is accessed as a hard disk drive, subdirectories and their files are accessible with conventional VAX/VMS commands (e.g., SET DEFAULT).

DISPLAY_ADRG_IVAS requires the names of the Distribution Rectangle (DR) and the General_Information_File (GEN) file. Usually, the DR and the GEN file have the same name, with the GEN file using a ".GEN" extension. The name of the DR is found by obtaining a directory listing of the ADRG CD-ROMs' root directory. The GEN file name can be found by obtaining a listing of the DR directory. The example of program execution (see subtopic EXAMPLE) shows how these file names are obtained. ADRG CD-ROM TPC G-19D is used in the example. The DR name is TPUS0101 and the GEN file, found inside this directory, is named TPUS0101.GEN. Once this information is known, DISPLAY_ADRG_IVAS can be executed.

4 Input_Output

Perform the following steps to execute DISPLAY_ADRG_IVAS:

A. Place the CD-ROM in one of the CDROM readers and mount it using the MOUNT_CDROM command.

B. Enter the ADRG CD-ROM reader containing the ADRG CD-ROM.

C. Enter the DR name.

D. Enter the GEN file name. The extension ".GEN" may be omitted as this is the default extension).

E. ZDR selection: The number of ZDRs contained within the DR is displayed. Minimum and maximum values for latitudes and longitudes are displayed for the first ZDR. The user has the option to display the data in the current (in this case, the first) ZDR or skip to the next ZDR.

   Selection of a ZDR is done by entering a lower or upper case 'Y' or by entering <RETURN>. To skip a ZDR, enter a lower or upper case 'N'.

   Enter a starting coordinate and an ending coordinate (ADRG polar data is the exception where only one coordinate is entered and one image per input coordinate is displayed).

   These points refer to the upper left and lower right corners of an area to display. Therefore, the upper left latitude must be greater than or equal to the lower right latitude and the upper left longitude must be less than or equal to the lower right longitude (if the two points are the same, only one screen of data will be displayed). Display proceeds from the upper left to the upper right until the right longitude is reached whereby the next frame returns to the left longitude and moves down in latitude.

   Once the entire defined area has been displayed, step E is repeated for the next ZDR. DISPLAY_ADRG_IVAS terminates when there are no more ZDRs to display.

F. Placement of coordinates on the IVAS monitor. There are nine choices:

   1) Top left corner (TL)
   2) Top center (TC)
   3) Top right corner (TR)
   4) Center left (LC)
   5) Center of screen (CC)
   6) Center right (RC)
   7) Bottom left corner (BL)
   8) Bottom center (BC)
   9) Bottom right corner (BR)

   Placement is selected by entering (lower case or upper case) any of the above options in parenthesis, TL through BR. Note

that the prompt ends with (TL/BR)[CC]. Where

(TL/BR) indicates valid selections are between the first and last options (inclusive). Any other values are invalid.

[CC] indicates that option 5 (Center of screen) is the default option.

After an image is displayed on the IVAS monitor the user must enter one of the following options:

Enter <RETURN> to continue to the next image

or

Enter <^Z> to generate an image on disk that will then be printed on the TEKTRONIX printer.

If the print option is selected, the user is prompted for an output file name. When generating images on disk, use the IIS_IMAGES:[username] directory and delete all files that are no longer needed, as the files tend to accumulate and take up valuable disk space. Once the file has been submitted to the printer, display resumes from where it left off.

G. Early termination. The user may terminate execution before the endpoint is reached with the following commands:

Enter <^Z> When prompted to "continue or create/print an image".

Enter <^Z> When prompted for an image file name.

4 Example

The following is an example of program execution

```
$ @mdffexe:mount_cdrom cdrom01
Mounting CDROM01
%I-ALLOC, _OSPREY$DUB0: allocated
%I-MOUNTED, ARC1 TPCXXG1 mounted on _OSPREY$DUB0:
$ dir cdrom01:[000000]
Directory OSPREY$DUB0:[000000]

TESTPA01.CPH;1      TPUS0101.DIR;1     TRANSH01.THF;1

Total of 3 files.

$ dir cdrom01:[tpus0101].gen
Directory OSPREY$DUB0:[TPUS0101]

TPUS0101.GEN;1

Total of 1 file.
```

```
$ run/nodebug v2_dir:display_adrg_ivas

ENTER Disk name: cdrom01
ENTER Directory path name: tpus0101
ENTER GEN file name: tpus0101
There are  2 ARC zones on this cd

northlat:  32.46063613891602 degrees = 32 deg 27 min 38.29 sec
southlat:  31.99982833862305 degrees = 31 deg 59 min 59.38 sec

westlong:-116.00003814697266 degrees = -116 deg  0 min  0.14 sec
eastlong:-108.99995422363281 degrees = -108 deg 59 min 59.84 sec

Use data from this area (Y/N)[Y]? n
northlat:  35.66695785522461 degrees = 35 deg 40 min  1.05 sec
southlat:  31.99982833862305 degrees = 31 deg 59 min 59.38 sec

westlong:-116.00016021728516 degrees = -116 deg  0 min  0.58 sec
eastlong:-108.99983978271484 degrees = -108 deg 59 min 59.42 sec

Use data from this area (Y/N)[Y]?
Starting position (Upper right  corner)

Enter coordinates as either decimal or deg,min,sec
Examples: 90.000 or 90 00 00 (use - for south/west
          latitude/longitude

Enter latitude to view: 35
Enter longitude to view: -115
Ending position (Lower left corner)

Enter coordinates as either decimal or deg,min,sec
Examples: 90.000 or 90 00 00 (use - for south/west
          latitude/longitude

Enter latitude to view: -34.5
Enter longitude to view: -114.5

Input coordinates are for:
Top Left corner  (TL)
Top Center       (TC)
Top Right corner (TR)
Left Center      (LC)
Center           (CC)
Right Center     (RC)
Bot Left corner  (BL)
Bot Center       (BC)
Bot Right corner (BR) (TL/BR)[CC]:

Latitude, Longitude    34.9872 -115.0508
Hit <CRT> to continue or <CTRL_Z> to create/print image: <CRT>
```

```
   Latitude, Longitude    34.9872 -114.5178
   Hit <CRT> to continue or <CTRL_Z> to create/print image:
   <CTRL_Z>

   Enter output file name
   (<CTRL_Z> not to print): iis_images:[riedlinger]test.image

   Writing image to disk!!
   Would you like full prompting? (Y or N) n

   Converting image to TEKTRONIX format

   Printing file!!!


  Latitude, Longitude    34.9872 -113.9848
  Hit <CRT> to continue or <CTRL_Z> to create/print image: <CTRL_Z>


   Enter output file name
   (<CTRL_Z> not to print): <CTRL_Z>

   End DISPLAY_ADRG_IVAS

   $ @mdffexe:dismount_cdrom cdrom01
   Dismounting CDROM01


3 DISPLAY_CAC_IVAS
   Reviews compressed data on the IVAS monitor.  Data are read from
   the CHART_ODI_DISK area and displayed on the IVAS screen 16
   segments at a time.

4 Input_Output
 Inputs required for program execution include:

        Enter the map scale (0:8)
        Enter the palette number
        Enter the TS zone number
  **    Segment Image (Y/N) [N]
              If Y will prompt: Color for lines (B/W) [B]
        Enter min row
        Enter max row
        Enter min col
        Enter max col

   Note:
   **  Grid lines may be drawn to visually "segment" the display.
       The default will not draw these lines.  When in the lines
       are to be drawn (i.e., "Y" was entered), a prompt for line
       color is presented.  The default line color is Black, the
       alternative color is White.
```

Output: Compressed segment data are displayed on the IVAS monitor 16 segments at a time.

4 Required_Subroutines

The following routines are called by DISPLAY_CAC_IVAS.

DISPLAY_CAC_IVAS:	Main program.
READER:	Module for reading the stream CAC file into memory.
GET_CAC_DATA_8_BIT:	Module for obtaining 8-bit CAC data.
GET_POS:	Module for setting up a position on the IVAS color monitor.
PRINTIO:	Module for printing an image from the IVAS.
NOARL_TEKPRINT:	TEKTRONIX printer driver for printing an image.
ADDTO_SCREEN_BUFFER:	Module for adding one 256 x 256 image to the large print buffer.

3 DISPLAY_CAC_PORTABLE

This X-windows/MOTIF version is designed to be portable to various VAX/VMS platforms. The name for this portable version is simply DISPLAY_CAC. Instructions for reading and displaying CAC data are listed as subtopics.

4 Getting_Started

The following items are required to install and execute DISPLAY_CAC:

a. A copy of DISPLAY_CAC.EXE. This may be stored on floppy diskette, 9-track tape, or 6250 drive. (i.e., on one of the systems's storage devices)

b. Volume and File Structure (VFS-ISO9660) software, serial #YT-GS001-01, Version 2.2. or F11CD-ISO9660 software, serial #A-MRAAA-H8, July 1992. NOTE: F11CD software requires VMS Operating System, Version 5.5.

c. CD-ROM reader hardware/software.

d. X-windows/MOTIF graphics display software.

The following procedure is used to install DISPLAY _CAC software:

a. Create a new directory (e.g., [.DISPLAY_CAC] to store the program.

b. Copy the DISPLAY_CAC.EXE program (from the floppy, or 9-track tape) into the [.DISPLAY_CAC] directory.

4 Selecting_CAC

Select a CAC CD-ROM that contains the desired area of coverage. The available area of coverage is depicted on the CAC's CD-ROM case.

1) Place the CAC CD-ROM to be viewed in the CD-ROM reader.

2) Mount the CD reader.

4 Program_Execution

1) Set default to the directory containing DISPLAY_CAC.EXE.

2) A symbol must be defined to execute DISPLAY_CAC. To define the symbol, type the following command at the operating system prompt:

```
display_cac == "$ XXXdisplay_cac.exe"
```

where XXX is a path to the [.DISPLAY_CAC] directory.

3) Execute DISPLAY_CAC by typing the command:

```
display_cac cdrom03:
```

where cdrom03: is the device name (i.e., CD-ROM reader) as a command line argument.

4 Viewing_CAC

1) Execute DISPLAY_CAC (see subtopic Program_Execution).

2) A map of the entire world is displayed on the screen. Click once on a center point of CAC data to be viewed.

   a. The map data area of coverage that is available can be obtained from the CAC's CD-ROM case.

   b. If the message 'No coverage available...try again.' appears when you click, try clicking again on a different area.

3) When a center point has successfully been selected, a blank white screen will appear, and the program will begin reading the map data from the CAC CD-ROM that has been loaded in the CD_ROM reader. NOTE:: This could take a minute or two.

4) After all the data has been read, the buttons UP, DOWN, LEFT, RIGHT, EXIT and DISPLAY DATA will appear. Click on the DISPLAY DATA button to display the CAC data on the screen.

4 Traversing_CAC

1) Once the first screen of CAC data has been displayed (see subtopic Viewing_CAC), more data located above, below, to the left and right can be viewed by clicking on the UP, DOWN, LEFT or RIGHT buttons, respectively.

2) Loading new data from the CAC CD-ROM could take a minute or so.

4 Program_Termination

1) To exit the program, just click on the EXIT button.

2) This will terminate the program and return control to the operating system.

3 DISPLAY_CAC_VWS

Displays Compressed Aeronautical Chart (CAC) segments on VAXstations running VWS software.

4 Invocation

DISPLAY_CAC_VWS may only be executed on VAXstations running VAX VWS software. Hence, workstations SPARK1 and SPARK3 are available for program execution.

Perform the following steps in invoke DISPLAY_CAC_VWS:

* Set the processing thread
* Type the command RUN/NODEB DISPLAY_CAC_VWS

4 Input_Output

DISPLAY_CAC_VWS requires the following input:

Zone number:	Enter the TS zone number that contains the compressed segments to be displayed.
Continuous Viewing? (Y/N) [Y]:	Enter 'Y' if more than one screen of data is to be displayed else enter 'N'. The default is 'Y'.
Segment image? (Y/N) [Y]:	Enter 'Y' to draw grid lines, which separates individual segments, within the image. The default is 'Y'.
Start ROW (CTRL_Z to restart):	Enter starting segment row number. Typing (^Z) restarts

the input prompts.

Start COL (CTRL_Z to change rows): Enter starting segment column number.

End ROW (CTRL_Z to restart): Enter end segment row number. Typing (^Z) restarts the input prompts.

End COL (CTRL_Z to change rows): Enter end segment column number. Typing (^Z) restarts the input prompts.

Note: The chart scale and PA number are obtained from the CHART_STATUS file.

Output consists of a 3-row by 4-column segment color display.

4 Required_Subroutines

DISPLAY_CAC_VWS utilizes the following subroutines:

READ_CHART_STATUS_HEADER: Reads needed information from the CHART_STATUS.DAT file.

READ_PALETTE: Reads the RGB data from the palette color table.

LOAD_COLORTABLE2: Loads the RGB values from the palette color table onto the 3200 graphics color lookup table.

FIND_PA_FOR_ZONE: For a given scale and zone, returns to the PA number.

GET_SEGMENT_NAME: Builds directory path names for compressed segment files.

CAC_UTIL: Source code for standard "C" routines used throughout the MDFF software suite.

SPDEC: "C" routine used to DECOMPRESS compressed segment files.

3 MAPSTATION_DRIVER

MAPSTATION_DRIVER displays the area of coverage from a mapstation subdirectory on a VAXstation 3200 monitor. A CalComp plot file, showing the areas of coverage, may also be created (and is used for generating hardcopies).

Before program execution, mapstation subdirectory files must be

transferred from a mapstation onto the MDFF cluster. At program execution, a mapstation subdirectory is read and one of the following tasks is selected and performed:

1. Create a CalComp plot file of
   * the individual segments and
   * the outline of a mapstation subdirectory (i.e., a pilot plot)

2. Display on the 3200 color monitor
   * the individual segments and
   * the outline of a mapstation subdirectory (i.e., a pilot plot)

MAPSTATION_DRIVER is menu driven. The following menu options are available, each of which is described as a subtopic:

```
Enter:
     1  for a pilot plot
     2  for a plot of individual segments
     3  for displaying individual segments on 3200
     4  for displaying pilot plot on 3200
     5  testing polar plots
```

4 Program_Notes

* (^Z) is used to exit each menu and to terminate program execution.

* The CalComp plot file is opened in the main program. All plot images are written into one output file which saves (expensive) plotter paper. Hence, one output plot file may contain several images, for example, a pilot plot image (option 1) and a plot of individual segments (option 2)

* Proper program termination via (^Z) must occur in order to have an EOF marker placed at the end of the plot file. Without an EOF marker, the CalComp plotter will remain in a halted state. Once in a halted state, the plot must be terminated by using the terminal (located next to the plotter) with either the CANCEL or FLUSH command.

* File extensions are not required as input. For example, when opening a plot file for JOG scale plots, the full file name is JOB.CALC Enter the file name without the extension: JOG

4 Pilot_Plot

This options creates an outline plot, called a pilot plot, of the area of coverage by the mapstation directories. This plot will be used by the aircraft pilots for AOD coverage purposes.

For each side of the AOD, all mapstation subdirectory files having the same chart scale should be plotted together. This will provide the total area of coverage (contained on the AOD), for a given scale, on one piece of paper.

Before this option is executed, the user must know the chart scale, zone, coverage for the entire plot area, and names of the mapstation subdirectory files.

5 Input

The following procedure must be repeated to include the area of coverage for each zone:

A prompt will ask for the number of subdirectories in a particular zone. Enter (ctrl-z) to stop entering subdirectory names and to exit this procedure.

After entering the number of subdirectories for a zone, program control loops to read that number of subdirectory names.

Once all of the subdirectory names are read, MAPSTATION_DRIVER will prompt for the zone number

The following prompts are provided for input:

Lower latitude and longitude: Enter the lower left coordinates of the rectangular area of coverage.

Upper latitude and longitude: Enter the upper right coordinates of the rectangular area of coverage.

Scale: Enter the chart scale.

Title: Enter the pilot plot title.

Side of AOD: Enter "A" or "B" to indicate which side of the AOD is being used to store the data.

(Area of coverage procedure)
How many files are to be combined
for this zone:(ctrl-z)to quit): Enter the number of mapstation subdirectories to be included as coverage for this zone, or enter (ctrl-z) to exit.

Mapstation directory name: This prompt repeats until all

subdirectory filenames have been entered.

Zone: Enter the zone number.

5 Output
The file naming convention for plot files is as follows:

AREA.CALC

where

AREA = A file name that is descriptive of the area of coverage.
CALC = The file extension, denoting the file is a CalComp plot file.

4 Plot_of_Individual_Segments
This option creates a plot of individual segments that are contained within a single mapstation subdirectory. The plot will be used by NWC to review the AOD for accuracy.

This option also creates a listing for each plot that contains the maximum and minimum latitude and longitude coordinates for each row of segments. Subtopic output contains additional information on output files.

Before this option is executed, the user must know the chart scale, zone, and the area of coverage for each subdirectory. The user must also know the subdirectory number.

NWC reviews each subdirectory separately. By using this approach, it is easier to determine the subdirectory bounds and accuracy. Hence, only one subdirectory per plot is allowed.

5 Input
The following prompts are provided for input:

Lower latitude and longitude: Enter the lower left coordinates of the rectangular area of coverage.

Upper latitude and longitude: Enter the upper right coordinates of the rectangular area of coverage.

Scale: Enter the chart scale.

Zone: Enter the zone's area of coverage

Title: Enter the pilot plot title.

Side of AOD: Enter "A" or "B" to indicate which side of the AOD is being used to store the data.

Subdirectory number:

Plot row_col: (which really means: would you like to label the row and col, and create a listing of the min/max latitude/longitude of each row). Enter "Y" or "N"

5 Output
The file naming convention for plot files is as follows:

AREA.CALC

where

AREA = A file name that is descriptive of the area of coverage.
CALC = The file extension, denoting the file is a CalComp plot file.

This option also creates a listing for each plot that contains the maximum and minimum latitude and longitude coordinates for each row of segments. The file naming convention for the plot file listings is as follows:

AREA.LIS

where

AREA = A file name that is descriptive of the area of coverage.
LIS = The file extension, denoting the file is a listing of a plot file.

4 Displaying_Individual_Segments
This option allows the user to display a mapstation subdirectory on the VAXstation 3200. This option is primarily used to obtain the area of coverage and to view missing segments within a single mapstation subdirectory.

5 Input
The following prompts are provided for input:

Scale: Enter the chart scale.

Zone: Enter the zone's area of coverage.

Mapstation filename: Enter the mapstation subdirectory name.

Once these prompts are answered, the last five row and column

numbers are displayed. At times, extraneous segments not actually part of the area of coverage are created. These segments are detected when their row/column numbers are out of sequence with valid segment row/column numbers.

* If the last set of row/column numbers are out of sequence, then they should be considered invalid segments and eliminated. Invalid segments are eliminated by simply reducing the number of segments to be viewed (hence, only including valid segments).

* The number of segments to be viewed should be changed to include the last valid set of row/column numbers.

4 Displaying_Pilot_Plot
This option allows the user to display the bounds of a mapstation subdirectory on the 3200. This option is primarily used to view the outline of a single mapstation subdirectory.

5 Input
The following prompts are provided for input:

Do you want to set the bounds
for this subdirectory: [n] The default is "n" for NO.
If "y" for YES:

Lower latitude and longitude: Enter the lower left coordinates of the rectangular area of coverage.

Upper latitude and longitude: Enter the upper right coordinates of the rectangular area of coverage.

Scale: Enter the chart scale.

Zone: Enter the zone's area of coverage.

Enter the number of files
to read for this zone: Enter the number of files, contained within the zone, that are to be included in the area of coverage.

Mapstation filename: Enter the mapstation subdirectory name.

4 Polar_Plots
This option will create either a plot file of the individual segments or an outline of the bounds for a single subdirectory of polar data.

The individual segment plot will be used by NWC to review the AOD

for accuracy. The bounds plot will be used by aircraft pilots for coverage purposes.

All latitudes and longitudes are hardcoded.

As of March 12, 1992, this program reads from a processing thread. Once there are actual polar mapstation subdirectories, this program will be updated.

5 Input
The following prompts are provided for input:

Scale: Enter the chart scale.

Zone: Enter the zone's area of coverage.

Title for the plot: Enter the plot's title.

Enter the side of
the AOD (A OR B): Enter "A" or "B" to indicate which side of the AOD is being used to store the data.

Enter the subdirectory
number to plot: Enter the number representing the appropriate mapstation subdirectory.

Do you want to draw
1. the bounds of the subdirectory
2. the individual segments
Enter 1 or 2:

Do you want to draw
the land: [y] The default is "y" for yes.

Do you want the political
boundaries: [y] The default is "y" for yes.

3 PLOT_CDS_VWS
Displays downsampled segments from ADRG CDs, with each segment represented by a rectangle. Downsampled segments from as many as 8 ADRG CDs may be simultaneously displayed. Segments having full pixel counts (65536 pixels), or core segments, are drawn with black lines. Segments having lower pixel counts, or edge segments, are drawn with red lines along with a dissecting line running in one of the following directions:

vertically
horizontally
diagonally - from upper left to lower right
diagonally - from upper right to lower left

Dissecting lines are used to create a visual distinction between edge segments.

The entire ADRG CD must be downsampled before it can be displayed with PLOT_CDS_VWS.

4 Invocation

PLOT_CDS_VWS may only be executed on workstations running VAX/VWS software. Hence, workstations SPARK1 and SPARK3 are available for program execution. Perform the following step to execute PLOT_CDS_VWS:

* Define a processing thread.
* Type the command RUN/NODEBUG V2_DIR:PLOT_CDS

4 Input

PLOT_CDS_VWS requires the following input.

Enter the M4 zone to plot [0-4] (only one zone at a time can be plotted).

Enter the type of data to plot: 1 for full segments only
2 for edge segments only
3 for both (full and edge)

Enter the last four characters of the chart name (DMA STOCK NUMBER).

Note: ADRG CD chart names are used as they utilize a geographic-based naming convention. For example, with JNC scale charts, chart X005 is located next to chart X006. MDFF CD numbers are not used as they are assigned sequentially at processing time. Hence, two adjacent charts, when not processed sequentially, possess non-sequential MDFF CD numbers. For example, JNC chart X005 has been assigned MDFF CD number 492 and JNC chart X006 has been assigned MDFF CD number 382 respectively).

Up to eight ADRG CDs may be displayed. When less than eight CDS are to be displayed, type <^Z> to terminate the last CD entry. PLOT_CDS_VWS will then display the segments.

Adjacent ADRG CDs (i.e., areas of contiguous coverage) have an overlap of edge segments. The edge segments that are shared by different CDs will have a pattern formed by the horizontal, vertical, or diagonal lines that are associated with the CDs.

3 PLOT_ODI

An interactive program that is used to define the area of coverage for a chart ODI build. Calcomp plots, depicting the total area of coverage, are created.

4 Invocation

PLOT_ODI may only be displayed on VAXstations that are running DECwindows software. Currently, SPARK2 is the only available DECwindows node.

Perform the following steps to execute PLOT_ODI:

* Set the appropriate processing thread
  $ADRGLOGS ###
  where ### is the three-character processing thread name

* Invoke PLOT_ODI
  $RUN/NODEB MDFFEXE:PLOT_ODI

4 Input_Output

Upon execution, the main selection box, containing three buttons is displayed. The buttons are labeled PLOT, CONTROL, and QUIT. Currently, only the PLOT and QUIT buttons are implemented.

Select the PLOT option to continue the program.
Select the QUIT option to terminate the program.

When the PLOT option is selected, a box containing all of the available scales is displayed. Select the appropriate scale by placing the arrow on the desired scale and clicking the first mouse button.

The complete available area of coverage is represented by a grid of colored squares. Each square within the grid represents an ADRG CD-ROM. A CD-ROM (i.e., area of coverage) is selected for inclusion (to the chart ODI build) by placing the arrow inside a square and double clicking the first mouse button. Once it has been selected, the square turns blue. Up to 200 CD-ROMS may be selected.

A CD-ROM may be unselected by double clicking the first mouse button inside a blue square. The square will then turn back to it's original color (either red or black). Squares that are colored red represent a CD-ROM that has already been incorporated into a CAC. Black squares represent CD-ROMs that have not been incorporated.

Once all of the desired CD-ROMs have been selected, the third mouse button should be clicked. Another selection box, containing PLOT and CANCEL options is displayed.

Use the PLOT option when the selections are complete. (Additional CD-ROM's may be selected at a later date.)

Use the CANCEL option to erase the CD-ROM selections that were made during this session.

When the PLOT option has been selected, a CalComp plot file that

shows the chart ODI area of coverage, is created. PLOT_ODI will prompt for the following information

a title for the plot,
a filename for the plot file
a target completion date for the chart ODI

A file extension must not be included as part of the plot file name. A directory path can be included as part of the file name. Once the plot file is created and written, the main selection box is again displayed.

4 Remote_Execution

PLOT_ODI requires the use of DECwindow software. Hence, only those nodes, that have DECwindow software, can be used for display (i.e., acting as the client).

PLOT_ODI can executed on any node as long as the client is located on a DECwindows supported node. Utilizing the speed of faster CPUs (e.g., node HARIER) enables faster program execution.

The following steps enable PLOT_ODI execution on node HARIER and display on the SPARK2 monitor:

1) Add the following lines to your LOGIN.COM file:

```
$! Identify SPARK2 monitor as the display device.
$  define DECW$DISPLAY WSA1
$!
$! Identify the display device on node SPARK2
$  set display/create/node=SPARK2
```

2) Add the appropriate node and user name to the security customization of your DECwindows session:

* Using the SESSION MANAGER menu, select the CUSTOMIZATION option.

* Using the CUSTOMIZATION menu:

  - Select the SECURITY option.

  - Identify a node by placing the arrow inside of the node name box and clicking the left mouse button. Using the keyboard, type the name of the node that will need access to the client (i.e., the SPARK2 monitor).

  - Identify a user name by placing the arrow inside of the user name box and clicking the left mouse button. Using the keyboard, type the name of the user who will need access to the client (i.e., the SPARK2 monitor).

- Once the appropriate names have been entered, select the ADD option.

The node and user names will now appear in the authorized user list. Additional names may be added to the authorization list by using the ADD option and repeating the above steps.

2 DOWNSAMPLE_CD

This program will produce the source ADRG CD-ROM's header file (the DMA ADRG product specification provides complete information concerning ADRG data). For each distribution rectangle on the ADRG CD-ROM, this program creates the DR Header File, Source Graphics Header File, and the DR coverage file. ADRG data are transformed from ARC projection to TS projection. Data are compressed by a factor of 4:1 due to the change in resolution from 256 pixels per inch (ARC) to 128 pixels per inch (TS).

2 DS_SEGS

This program is used to downsample specific Tessellated Spheroid (TS) segments from ADRG data that are stored on CD-ROM.

3 Input_Output

Perform the following steps to execute DS_SEGS:

A. Define a processing thread.

B. After placing the appropriate ADRG CD-ROM onto a CDREADER, mount the CD-ROM using the MOUNT_CDROM command.

C. Invoke DS_SEGS using the command: RUN/NODEB V2_DIR:DS_SEGS

D. DS_SEGS will prompt for the following information:

* The CDREADER that contains the ADRG CD-ROM.

* The path to use for writing downsampled TS data (the user is given 3 choices,

1) MDFF_SCRATCH:[CB_REPAIR]

2) CHART_SEGMENTS:

3) A user-defined area (see example 1 below),

* The M4 zone from which to downsample.

* The start and end row and col of TS segments to downsample.

DS_SEGS displays the number of Distribution Rectangles (DRs) on the ADRG CD-ROM and the number of Zone Distribution Rectangles (ZDR) associated with each DR.

DS_SEGS attempts to downsample each segment from all ZDRs associated with each DR. If a segment is not within a ZDR, a message is printed and the program begins downsampling for the next segment.

Once all ZDRs are exhausted for a particular DR, DS_SEGS tries downsampling the next DR and its ZDRs. When ADRG data are downsampled into a segment, a pixel count is displayed. A full or core segment must have pixel counts that add up to 65536 pixels. Unfilled or edge segments possess fewer than 65536 pixels and require additional downampled data from appropriate adjoining ADRG CD(s). Because a segment may be downsampled partially or wholly from more than one ZDR and DR, an individual segments' pixel count may add up to more than 65536 pixels.

The following are two example runs of DS_SEGS. EXAMPLE 1 downsamples one TS segment from an ADRG CD (row 1, column 125) and sends output to a user-defined area. EXAMPLE 2 downsamples two TS segments from an ADRG CD (row -22, columns 12 and 13) and sends the output to the MDFF_SCRATCH:[CB_REPAIR] area.

3 Examples

The following are examples of program execution.

Example 1: Downsample one TS segment from an ADRG CD (row 1, column 125) and send output to a user-defined area.

Example 2: Downsample two TS segments from an ADRG CD (row -22, columns 12 and 13) and send output to the MDFF_SCRATCH:[CB_REPAIR] area.

4 Example_1

Downsample one TS segment from an ADRG CD (row 1,column 125) and send output to a user-defined area.

```
$ @mdffexe:use_adrg_logicals a5b
$ @mdffexe:mount_cdrom cdrom1
Mounting CDROM1
%I-ALLOC, _OSPREY$DUB0: allocated
%I-MOUNTED, ARC1_JNCXX05 mounted on _OSPREY$DUB

$ run/nodebug v2_dir:ds_segs
Enter CD device drive: cdrom1
Enter downsample segments directory
Enter: 1 for MDFF_SCRATCH:[CB_REPAIR]
       2 for CHART_SEGMENTS:
       3 for other: 3
Enter output destination (INCLUDE []):
```

```
mdff$disk:[riedlinger.ds_segments]
Enter M4 zone # to process (0/4): 2
Enter start, end ROW of segments to downsample: 1,1
Enter start, end COL of segments to downsample: 125,125

There are 1 DR(s) on this CDROM
Processing DR: 01
     Num ZDRs:            1
     ARC zone:            1
     ZDR num:             1
     Processing ROW/COL:                 125
     PIXELS DOWNSAMPLED:       65536
Enter M4 zone # to process (0/4): <CRTL_Z>
$ @mdffexe:dismount_cdrom cdrom1
dismountcd cdrom1
Dismounting CDROM1
```

4 Example_2

Downsample two TS segments from an ADRG CD (row -22, columns 12 and 13) and send the output to the MDFF_SCRATCH:[CB_REPAIR] area.

```
$ @mdffexe:mount_cdrom cdrom1
Mounting CDROM1
%I-ALLOC, _OSPREY$DUB0: allocated
%I-MOUNTED, ARC1_JNCXX11 mounted on _OSPREY$DUB0:

$ run/nodebug v2_dir:ds_segs
Enter CD device drive: cdrom1
Enter downsample segments directory
Enter: 1 for MDFF_SCRATCH:[CB_REPAIR]
       2 for CHART_SEGMENTS:
       3 for other: 1
Enter M4 zone # to process (0/4): 0
Enter start, end ROW of segments to downsample: -22,-22
Enter start, end COL of segments to downsample: 12,13

There are 1 DR(s) on this CDROM
Processing DR: 01
     Num ZDRs:            5
     ARC zone:           11
     ZDR num:             1
TOP ZONE:           1
BOT ZONE:           1
Input zone of       0 not within ARC1 zone of          11
    ARC zone:          12
    ZDR num:           2
    Processing ROW/COL:         -22          12
    Segment not in bounds of this ZDR
    Processing ROW/COL:         -22          13
    Segment not in bounds of this ZDR
```

```
      ARC zone:            13
      ZDR num:             3
      Processing ROW/COL:          -22          12
      Segment not in bounds of this ZDR
      Processing ROW/COL:          -22          13
      Segment not in bounds of this ZDR
      ARC zone:            14
      ZDR num:             4
      Processing ROW/COL:          -22          12
      PIXELS DOWNSAMPLED:        65536
      Processing ROW/COL:          -22          13
      PIXELS DOWNSAMPLED:        65536
      ARC zone:            15
      ZDR num:             5
      Processing ROW/COL:          -22          12
      Segment not in bounds of this ZDR
      Processing ROW/COL:          -22          13
      Segment not in bounds of this ZDR
  Enter M4 zone # to process (0/4): <CTRL_Z>

  $ @mdffexe:dismount_cdrom cdrom1
  $ cdrom1
  Dismounting CDROM1


2 DUMP_CODEBOOK_STATUS
 DUMP_CODEBOOK_STATUS lists information about the codebooks of a
 specific CD or PA, that is being processed under a given
 processing thread.

 DUMP_CODEBOOK_STATUS is invoked through a DCL-like command.  It is
 a "foreign" command that is defined in MDFFEXE:MDFF_SYMBOLS.COM.

 Format

 DUMP_CODEBOOK_STATUS [processing thread]

3 /CD_NUMBER
  /CD_NUMBER[=(CD number)[,...])]

  Dump specified MDFF CD number(s) codebooks.


3 /OUTPUT
  /OUTPUT=SYS$OUTPUT (default)
  /OUTPUT[=file specification]

  Directs the output to the specified file.


3 /PA_NUMBER
  /PA_NUMBER[=(PA number)[,...])]
```

Dump codebooks from specified PA Directories.

3 /PRINT
/PRINT=MDFF_PRINT_QUEUE (default)
/PRINT[=queue]

Prints the output to a specified printer.

2 DUMP_COLPAL_DB
Lists information about each existing color palette onto the user's video monitor, or SYS$OUTPUT.

Type the following command to run DUMP_COLPAL_DB:
RUN/NODEB V2_DIR:DUMP_COLPAL_DB

3 Information_Record
The following information is included for each color palette:

PA ID	MS	MZ	PA Area	Date:Time	Left Long	Right Long	Top Lat	Bot Lat

Where
PA ID: Palette identification number.
MS: Map scale.
MZ: Model 4 TS zone number.
PA Area: Palette area.
Date:Time: Date and time of color palette creation.
Left Long: Left longitude boundary for area of coverage by this color palette.
Right Long: Right longitude boundary for area of coverage by this color palette.
Top Lat: Top latitude boundary for area of coverage by this color palette.
Bot Lat: Bottom latitude boundary for area of coverage by this color palette.

2 DUMP_DS_SEGMENTS
DUMP_DS_SEGMENTS lists information about the downsampled segments of a CD that is being processed under a given processing thread name.

DUMP_DS_SEGMENTS is invoked through a DCL-like command. It is a "foreign" command that is defined in MDFFEXE:MDFF_SYMBOLS.COM.

Format:

DUMP_DS_SEGMENTS [processing thread]

3 /CD_NUMBER

```
  /CD_NUMBER[=(CD number)[,...])]

  Dumps the status of the downsampled segments of the
  specified MDFF CD number(s).

3 /OUTPUT
  /OUTPUT=SYS$OUTPUT (default)
  /OUTPUT[=file specification]

  Directs the output to the specified file.
  By default, output is directed to SYS$OUTPUT.

3 /PRINT
  /PRINT=MDFF_PRINT_QUEUE (default)
  /PRINT[=queue]

  Prints the output to the specified printer.
  The default the print queue MDFF_PRINT_QUEUE


2 ENCODEKEY
    This program prompts for a segment's row and column numbers.
    These numbers are encoded to a key that is displayed as output.
    The key comprises part of the segment's file name:

    key = [(2 * maxrow + 1) * (col + maxrow)] + row + maxrow + 1

    where maxrow = 9000


2 FIND_CD_STATUS
  FIND_CD_STATUS.COM checks all processing threads for the
  UNAVAILABILITY of CD-ROM readers.  For each processing thread,
  the current CHART_STATUS file is opened, and the
  CHART_STATUS_RECORD is read and searched for each entry
  containing the following information:

     LAST_COMPLETED_PHASE that is less than or equal to ADRG_READ
     PROCESSING_STATE     that is less than or equal to
                          DOWNSAMPLING_ADRG

  When an entry is found to satisfy the above criteria, the
  following message is displayed:
              Reader CDROM0#(ADRG) is not available!!!
              where
                     CDROM0# is the CD-ROM reader number
                     ADRG is the DMA ADRG CD name

  Additionally, a call to SHOW_CDREADER_STATUS is included to show
  which CD-ROM readers are currently in use.

  FIND_CD_STATUS.COM relies on the following programs:
```

FIND_CD_STATUS_DRIVER - Determines current processing thread and the number of entries contained in the CHART_STATUS file (which is passed to FIND_CD_STATUS).

FIND_CD_STATUS - Receives number of entries for a particular processing thread, and reads the CHART_STATUS_RECORD searching for entries, whose last_completed_phase and processing_state meet the above criteria (a message is displayed for those entries meeting these criteria).

2 LIST_CHART_STATUS

LIST_CHART_STATUS reads the CHART_STATUS file of the current or specified processing thread. Information about the thread and its associated charts are listed.

LIST_CHART_STATUS is invoked through a DCL-like command. It is a "foreign" command in MDFFEXE:MDFF_SYMBOLS.COM and can be abbreviated as LIST.

Format

```
LIST [processing thread] qualifier(s)
```

3 Examples

Example 1

```
$ LIST
```

Lists all entries in CHART_STATUS for the currently defined processing thread. If no thread has been set, the user will be asked to enter a valid thread name.

Example 2

```
$ LIST A3B
```

Lists all entries in CHART_STATUS for processing thread A3B.

3 /ALL

Lists every entry in the CHART_STATUS file. The program default.

Format

```
LIST /ALL
```

```
3 /CD_NUMBER
 Lists entries in CHART_STATUS that possess the specified MDFF CD
 number(s).

 Format

     LIST /CD_NUMBER[=(CD number)[,...])]

4 Example
  $ LIST/CD_NUMBER=(511,600)

  Lists CHART_STATUS entries with CD numbers 511 and 600.


3 /ENTRY
 Lists specified entry number(s) in CHART_STATUS.

 Format

     LIST /ENTRY[=(entry number)[,...])]


3 /FULL
 Lists the complete status record.  The default is NOFULL.

 Format

     LIST /[NO]FULL (default)


3 /HEADER
  Includes the header record in the listing.  The default is
  NOHEADER

  Format

      LIST /[NO]HEADER

4 /HEADER=ONLY

  Lists only the header record.


3 /OUTPUT
 Directs the output to the specified file.  By default, output is
 sent to SYS$OUTPUT.

 Format

     LIST /OUTPUT[=file specification]

4 Example
```

```
$ LIST A3B/PRINT=HARIER$LZ1/OUTPUT=MYFILE.OUT
```

Lists all entries of processing thread A3B to an output file named MYFILE.OUT and sends a copy of to the print queue HARIER$LZ1 to be printed.

3 /PASS

Lists every entry in the CHART_STATUS file associated with the specified PASS. By default, entries associated with PASS1 are listed.

Format

```
LIST /PASS[=pass number]
```

3 /PRINT

Prints the listing on a specified printer. By default, output is sent to the print queue that is defined by the DCL symbol MDFF_PRINT_QUEUE.

Format

```
LIST /PRINT[=queue]
```

4 Example

```
$ LIST A3B/PRINT=HARIER$LZ1/OUTPUT=MYFILE.OUT
```

Lists all entries of processing thread A3B to an output file named MYFILE.OUT and sends a copy to the print queue HARIER$LZ1 to be printed.

4 /COPIES

Indicates the number of copies to be printed.

Format

```
LIST /PRINT/COPIES=#
```

where # is the number of copies to be printed on SYS$OUTPUT.

3 /STOCK_NUMBER

Lists CHART_STATUS entries that contain the specified DMA stock number(s).

Format

```
LIST /STOCK_NUMBER[=("stock number")[,...])]
```

4 Example

```
$ LIST A3B/STOCK_NUMBER=TPCXX/HEADER

  List all CHART_STATUS entries with the substring 'TPCXX' as part
  of their DMA STOCK NUMBER.  The header will also be displayed on
  the screen.

2 PROCESS_CHART
    Exists as a continuing background process that monitors and
    maintains CHART ODI processing.

2 READ_ADRG_DATA
    This program reads a specific file or a set of files
    (encompassing the CD-ROM image to be used in the chart ODI
    build) from CD-ROM or magnetic tape.  The file(s) will be
    placed in the directory that is specified in a passed parameter
    to speed up overall MDFF processing.

2 SHOW_CDREADER_STATUS
    Displays the status of CD-ROM readers; availability and owner
    process names (for unavailable readers).

 2 TEK
 Prints files with extensions .TEK  or .IMAGE on the TEKTRONIX
 printer, via the TEK$PRINT queue.  TEK is invoked through a DCL-
 like command: it is a "foreign" command in
 MDFFEXE:MDFF_SYMBOLS.COM.

 Format
          TEK [/qualifiers]  filename
    where
         qualifiers include [COPIES]
                            [CREATE]**
                            [KEEP]
                            [NONOTIFY]
                            [PRINT]
                            [RECOVER]**
                            [REMOVE]
                            [SHOW]

         filename is the .TEK or .IMAGE file name

 ** See sub-topic System_management_tools for information about
    these qualifiers.

3 /COPIES
 Specifies the number of copies to be printed.

    /COPIES[=# of copies]       (default = 1)

4 Examples

 1.  $TEK/PRINT=EXAMPLE.IMAGE/COPIES=2/KEEP=NONE/NONOTIFY
```

The TEK command prints two copies of the file 'EXAMPLE.IMAGE', deletes the .IMAGE file and the .TEK file upon printing, and does not notify the user when the job has completed printing.

3 /KEEP
Specifies which files should be deleted or kept after printing. The default is to keep the .IMAGE file and to delete the .TEK file.

The following values may be used with /KEEP for the following actions:

/KEEP (default = /KEEP=IMAGE)	
/KEEP=NONE	.TEK and .IMAGE files are deleted.
/KEEP=ALL	.TEK and .IMAGE files are kept.
/KEEP=TEK	.TEK file is kept and the .IMAGE file is kept (if one exists).
/KEEP=IMAGE	.IMAGE file is kept and the .TEK file is deleted. (Default)

4 Examples
1. $TEK/PRINT=EXAMPLE.IMAGE/COPIES=2/KEEP=NONE/NONOTIFY

The TEK command prints two copies of the file 'EXAMPLE.IMAGE', deletes the .IMAGE file and the .TEK file upon printing and does not notify the user when the job has completed printing.

2. $TEK/PRINT=EXAMPLE.TEK/KEEP=TEK

The TEK command prints one copy of the .TEK file 'EXAMPLE.TEK' and does not delete the .TEK file after printing.

3 /NONOTIFY
The user will not be notified when the print job(s) have completed. The default is NOTIFY.

4 Examples
1. $TEK/PRINT=EXAMPLE.IMAGE/COPIES=2/NONOTIFY

The TEK command prints two copies of the file 'EXAMPLE.IMAGE' and does not notify the user when the job has completed printing.

3 /PRINT
Prints a .TEK or an .IMAGE file. Only file names with .TEK or .IMAGE extensions may be specified. Since there is no default file type, a file name using one of these extensions must be specified.

```
4 Examples
 1.  $TEK/PRINT=EXAMPLE.TEK/KEEP=TEK

 The TEK command prints one copy of the .TEK file 'EXAMPLE.TEK'
 and does not delete the .TEK file after printing.

 2.  $TEK/PRINT=EXAMPLE.IMAGE/COPIES=2/KEEP=NONE/NONOTIFY

 The TEK command prints two copies of the file 'EXAMPLE.IMAGE',
 deletes the .IMAGE file and the .TEK file upon printing, and does
 not notify the user when the job has completed printing.

3 /REMOVE
 Removes specified entry number(s) from TEK queue. Special
 privileges are required to remove job entries belonging to other
 users.

  /REMOVE={entry_num | (entry_num,entry_num,...)
                     | entry_num:entry_num}

4 Examples
 1.  $TEK/REMOVE=(1,6,7)

 The TEK command identifies which job entries to remove from the
 FIFO queue: job entries 1, 6, and 7 will be removed from the
 queue.

 2.  $TEK/REMOVE=1:5

 The TEK command uses a range of job entries to remove jobs from
 the FIFO queue: job entries 1 through 5 will be removed from the
 queue.

3 /SHOW
 Displays current status of jobs in the FIFO queue.  The FIFO queue

 holds the following information:

  FIFO queue status
  IIS_IMAGES disk space
  TEK$PRINT queue status
  Jobs being printed

  Job states:
   WAITING     - waiting in the queue.
   PROCESSING - being converted from an .IMAGE file to a .TEK file.

   PROC_COMP   - conversion complete, waiting to be printed.
   PRINTING    - being printed on the TEKTRONIX printer.
   COMPLETE    - job complete.
```

4 Examples

1. $TEK/SHOW

The TEK command shows information about the FIFO queue: all print jobs and their status.

3 IMAGE_Files
When a file with an .IMAGE extension is specified, the print job is placed into the FIFO queue In order to be printed, an .IMAGE file must first converted into a .TEK file. The .TEK file will be created in the user's IIS_IMAGES:[user] directory. Once it has been created, the .TEK file is sent to the TEK$PRINT queue for printing.

The status of a print job, which is still in the FIFO queue, is provided through the TEK/SHOW command.

A print job can be removed from the FIFO queue with the TEK/REMOVE command. TEK/REMOVE can not remove jobs in the TEK$PRINT queue.

By default, the .TEK file is deleted after printing. Use the /KEEP=TEK qualifier to prevent the TEK file from being deleted (see subtopic /KEEP).

3 Print_Queues
TEK relys on two queues for printing; a FIFO queue and the VAX/VMS print queue TEK$PRINT.

4 FIFO_Queue
The FIFO queue is designed to hold print jobs and provide information about their various states. All jobs are eventually sent to the TEK$PRINT queue for printing. Available information includes:

FIFO queue status
IIS_IMAGES disk space
TEK$PRINT queue status
Jobs being printed

Print job states:
WAITING - waiting in the queue.
PROCESSING - being converted from an .IMAGE file to a .TEK file.

PROC_COMP - conversion complete, waiting to be printed.
PRINTING - being printed on the TEKTRONIX printer.
COMPLETE - job complete.

This information is available through the /SHOW qualifier (see /SHOW).

TEK_CONTROL is an independent batch process that monitors the FIFO

queue and acts upon jobs according to their status. For example, jobs that possess a "PROC_COMP" status are sent to the TEK$PRINT queue for printing.

4 TEK$PRINT_Queue
A VAX/VMS print queue that prints .TEK files on the TEKTRONIX printer.Information about this queue is available through conventional VMS/DCL commands (see VMS HELP topic SHOW).

3 Subroutine_Invocation
TEK functionality is available through use of the C language subroutine ADD_TO_TEK_QUEUE. All values are passed by reference.

Invocation syntax:

```
ADD_TO_TEK_QUEUE (print_filename, num_of_copies,
                  keep_flag, notify_flag);
```

where

print_filename = name of the .IMAGE or .TEK file to be printed

num_of_copies = number of copies to be printed.

keep_flag = 0, 1, 2, or 3

- 0 = /KEEP=NONE
- 1 = /KEEP=IMAGE
- 2 = /KEEP=ALL
- 3 = /KEEP=TEK

notify_flag = TRUE or FALSE

- TRUE = NOTIFY
- FALSE = NONOTIFY

3 System_Management_Tools
The following options are available for system management functions. System privileges are required for their use.

/CREATE Creates the TEK Job Queue data file.

/RECOVER Recovers the TEK Job Queue data file after a system failure has occurred.

3 TEK_Files
Files with a .TEK extension are sent directly to the TEKTRONIX printer (i.e., TEK$PRINT) for printing.

By default, the .TEK file is deleted after printing. Use the /KEEP=TEK qualifier to prevent the TEK file from being deleted (see sub-topic /KEEP).

2 TRIM_ODI_STRUCT
TRIM_ODI_STRUCT moves designated compressed and downsampled segments from a specified processing thread into a trimmed

directory that is located on the same disk. In effect, moving these segments out side of the area of coverage, "trims" the data that is used as part of an ODI build. All trimmed segments, both compressed and downsampled, are marked as being "TRIMMED" in the SEGMENTS.DAT file.

Two types of bitmaps are used in performing the ODI trim:
* Bitmaps for defining the current area of coverage
* Bitmaps for the desired ODI bounds

Using the SEGMENTS.DAT file, bitmaps of the current area of coverage, are built. Bitmaps for the ODI bounds are based upon the ODI_BOUNDS.DAT file, where the southwest latitude/longitude and northeast latitude/longitude corners of rectangles are used to define the desired areas to keep (i.e., the bitmaps are composed of these rectangles). For additional information about bitmaps, see MDFFHELP topic BITMAPS.

Once built, the coverage and ODI bounds bitmaps are compared to determine which segments are to be trimmed (i.e., moved to the trim directory); all segments that lie outside of these rectangles will be trimmed.

3 Input_Output

There is no user input. Necessary information for performing the ODI trim is automatically obtained from the SEGMENTS.DAT and ODI_BOUNDS.DAT files. The ODI_BOUNDS.DAT file can be modified through the PASS2 phase of CHART_CONTROL.

TRIM_ODI_STRUCT moves the segments to a scratch area instead of permanently deleting them. This is accomplished by creating a trimmed directory on the same disk and level as the parent directory of the map data.

EXAMPLE 1: Trimmed Directory for Compressed Segments.
If the current parent directory is CHART_ODI:[MDFF.A5B],
then a new trimmed directory named CHART_ODI:[MDFF.A5B_TRIMMED]
is created.

EXAMPLE 2: Trimmed Directory for Downsampled Segments.
If the current parent directory is CHART_SEGS:[MDFF.A5B],
then a new trimmed directory named CHART_SEGS:[MDFF.A5B_TRIMMED]
is created.

Once the trimmed directories have been created, palette directories and row directories are created within the trimmed directories, to house the segments that are to be trimmed (i.e., moved into these new areas).

3 Invocation

TRIM_ODI_STRUCT was designed to be executed as a detached process from CHART CONTROL but can also be executed from VMS.

Use the following instructions to execute from the VMS level:

(1) Set the process thread of the map data to be trimmed.
(2) Type RUN/NODEB MDFFEXE:TRIM_ODI_STRUCT.

APPENDIX F
TOPIC FILE CAC_SOURCE_CODE.HLP

TOPIC FILE: CAC_SOURCE_CODE.HLP

The following text and subtopics appear when **CAC_Source_Code** is selected as an **MDFFHELP** subtopic:

```
CAC_Source_Code

 This topic provides software descriptions such as how to
 call a particular subprogram and what setup information is
 required (e.g. include files, variable declarations,
 etc.).

 The programming languages used are included as file
 extensions:  routines written in FORTRAN have a file
 extension ".FOR" and routines written in C have a file
 extension ".C".

 Additional information available:

 Overview          BITMAP_APPL.C             BITMAP_ODI.C
 BITMAP_PROCS.C    BITMAP_SEGMENTSDAT.C      BITMAP_SOURCE.C
 BITMAP_TRANS.C    BUILD_CD_ID.C     CAC.C   CAC_MISC.C
 CAC_UTIL.C        CCOMMA.C          CHECK_LON_ORIENTATION.C
 CLEAN_UP.C COORDINATES.FOR          CREATE_PA_DIR.C
 DECIMAL.FOR       DTR_PROCS.FOR
 FCOMMA.C    FILE_ATTR_PROCS.C       FIND_CAC_BITMAP.C
 FIND_FILE.FOR     GENERIC_QUEUE_STOPPED.FOR
 GET_DS_SEGMENT_NAME.FOR             GET_ODI_DATA.C
 GET_PA_SEGMENT_NAME.FOR             GET_PID.FOR
 GET_UNIX_BINARY_TIME.C              IIS_PLOT_PROCS.FOR
 LL_MAXMIN.C       MAP_DIR_PROCS.C   QAL_MAXMIN.C
 QUAD_PROCS.C      RC_MAXMIN.C       SEND_MAIL.FOR
 SEND_MAIL_C.C     TIMEM.MAR         USE_ADRG_LOGICALS.FOR
```

The following text comprises this **MDFFHELP** topic file. Note that subtopics begin with the key "2", which is located in column 1.

```
1 CAC_Source_Code

    This topic provides software descriptions such as how to
    call a particular subprogram and what setup information is
    required (e.g., include files, variable declarations, etc.).

    The programming languages used are included as file extensions:
    routines written in FORTRAN have a file extension ".FOR" and
    routines written in C have a file extension ".C".
```

2 Overview

Available functions are briefly described. The programming languages used are included as file extensions: routines written in FORTRAN have a file extension ".FOR" and routines written in C have a file extension ".C".

BITMAP_APPL.C: A suite of high-level routines that perform a variety of complex bitmap operations.

BITMAP_ODI.C: A suite of routines that create bitmaps from the MDFF:SCRATCH:[000000]ODI_BOUNDS.DAT file.

BITMAP_PROCS.C: A suite of low-level routines that perform a variety of basic bitmap operations.

BITMAP_SEGMENTSDAT.C: A suite of routines that build bitmaps from the SEGMENTS.DAT file.

BITMAP_SOURCE.C: A suite of routines that build bitmaps from downsampled and compressed segment data.

BITMAP_TRANS.C: Combines two or more bitmaps.

BUILD_CD_ID.C: Creates the [ID]CD_ID file according to the format of table 10 HTI specification.

CAC.C: A suite of routines that provide portable support for reading CAC CD-ROMs.

CAC_MISC.C: A suite of low-level CAC reader routines.

CAC_UTIL.C: A suite of high-level CAC reader routines.

CCOMMA.C: Places a comma(s) in an integer number. Can only be used with other C routines.

CHECK_LON_ORIENTATION.C: Determines whether a minimum longitude and a maximum longitude are indeed the true minimum and maximum longitude values for a data set.

CLEAN_UP.C: Transverses the current processing thread directory structure and performs functions necessary for trimming the chart ODI.

COORDINATES.FOR: Converts latitude/longitude coordinates into their degrees, minutes, and seconds equivalents.

CREATE_PA_DIR.C: --- TO BE ADDED LATER ---

DECIMAL.FOR: Converts a coordinate (in character format) to its decimal equivalent. Designed to work with the routine COORDINATES.FOR

DTR_PROCS.FOR: A suite of routines for converting to/from Datatrieve data storage format.

FCOMMA.FOR: Places a comma(s) in an integer number. Can only be used with other FORTRAN routines.

FILE_ATTR_PROCS.C: A suite of routines that provide information about VAX/VMS files and directories.

FIND_CAC_BITMAP.C: Returns all CAC logged bitmap file names that are stored in the MDFF_SYSTEM:[BITMAPS] directory for a given scale and zone.

FIND_FILE.FOR: Uses search and file names to find a file.

GENERIC_QUEUE_STOPPED.FOR: Determines whether a generic queue is stopped.

GET_DS_SEGMENT_NAME.FOR: Builds the path name for a downsampled segment file.

GET_ODI_DATA.C: Reads mapstation subdirectories, extracts row/column values and returns the sorted (by ascending row) values.

GET_PA_SEGMENT_NAME.FOR: Builds the path name for a compressed segment file.

GET_PID.FOR: A suite of routines that obtain a Process Identification (PID) code.

GET_UNIX_BINARY_TIME.C: A suite of routines that convert a VAX time string into the corresponding UNIX binary time.

IIS_PLOT_PROCS.FOR: A suite of routines that enable the use of graphics device and generation of hardcopy plots on the TEKTRONIX printer.

LL_MAXMIN.C: A suite of routines that determine the true pair of minimum and maximum coordinates (Lat/Lon) from a set of coordinate pairs.

MAP_DIR_PROCS.C: A suite of routines that perform a variety of operations on a MAP directory and the files it contains.

QAL_MAXMIN.C: A suite of routines that use the ADRG QAL file to determine the true minimum and maximum latitude/longitude coordinates for polar data.

QUAD_PROCS.C: A suite of routines that compute the minimum and maximum latitude/longitude coordinates for polar data.

RC_MAXMIN.C: A suite of routines that determine the true pair of minimum and maximum row/column values from a set of row/column pairs.

SEND_MAIL.FOR: Sends a VAX/VMS mail message from programs written in FORTRAN programming language.

SEND_MAIL_C.C: Sends a VAX/VMS mail message from programs written in C programming language.

TIMEM.MAR: A C language routine that separates one quadword into two longwords.

USE_ADRG_LOGICALS.FOR: Inserts the specified processing thread's logical name table into the LNM$FILE_DEV logical name search path.

2 BITMAP_APPL.C

Contains a suite of high-level routines that perform a variety of complex bitmap operations. For additional information about bitmaps, see MDFFHELP main topic BITMAPS.

3 Include Files

There are two files that must be included for use with BITMAP_APPL.C. Their names and brief descriptions follow.

V2_DIR:BITMAP_APPL.H Contains data definitions used by the subroutines.

V2_DIR:DATA_DEFS.H Contains type definitions for common variables (e.g., scale, zone)

The following subroutines are required for linkage. For additional information about each subroutine, see MDFFHELP under the main topic CAC_SOURCE_CODE.

BITMAP_PROCS.C A Suite of low-level routines that perform a variety of basic bitmap operations.

LL_MAXMIN.C A suite of routines that determine the true pair of minimum and maximum latitude/longitude coordinates.

QUAD_PROCS.C A suite of routines that compute the minimum and maximum latitude/longitude coordinates for polar data.

RC_MAXMIN.C A suite of routines that determine the true pair of minimum and maximum row/column values from a set of row/column pairs.

3 Suite_Description
BITMAP_APPL.C contains the following subroutines:

4 BITMAP_APPL_INIT
This function is passed the chart scale of the data being manipulated and should be invoked first, before any other routine within this suite. The following syntax is used to invoke bitmap_appl_init:

```
void bitmap_appl_init (SCALE *mapscale)
```

4 BITMAP_COUNT_INIT
Sets the count of bitmaps for all zones to zero. There are no values returned or arguments passed. The following syntax is used to invoke bitmap_count_init:

```
void bitmap_count_init (void)
```

4 BITMAP_FROM_LATLON
When passed a scale, zone, and latitude/longitude coordinates of the lower left and upper right corner of a rectangle, this function builds a bitmap of this rectangle and returns the minimum and maximum row/column values of the bitmap. The following syntax is used to invoke bitmap_from_latlon:

```
BIT *bitmap_from_latlon (SCALE *mapscale, ZONE *mapzone,
                         LON *minlon, LON *maxlon,
                         LAT *minlat, LAT *maxlat,
                         COL *mncol, COL *mxcol,
                         ROW *mnrow, ROW *mxrow)
```

where

BIT	The returned bitmap
mapscale	Contains the chart scale
mapzone	Contains the TS zone the data lie within
minlon	Contains the minimum segment longitude coordinate
maxlon	Contains the maximum segment longitude coordinate
minlat	Contains the minimum segment latitude coordinate
maxlat	Contains the maximum segment latitude coordinate
mncol	Contains the minimum segment column number
mxcol	Contains the maximum segment column number
mnrow	Contains the minimum segment row number
mxrow	Contains the maximum segment row number

```
4 COMBINE_BOXES_RET
 Combines all rectangles defined by the functions
 "define_boxes_send" and "define_boxes_per_zone" into one bitmap
  for a given zone.  The following syntax is used to invoke
  combine_boxes_ret:

  BIT *combine_boxes_ret (ZONE *zone)

 where
       BIT  Is the returned bitmap
      zone  Contains the TS zone the data lie within


4 DEFINE_BOXES_PER_ZONE
 Is passed a rectangle that is contained within one (and only one)
 zone.  The rectangle is defined by minimum and maximum
 latitude/longitude coordinates.  This function stores the
 latitude/longitude and row/column coordinates in separate two-
 dimensional arrays.  The following syntax is used to invoke
 define_boxes_per_zone:

  void define_boxes_per_zone (ZONE *zone, LON *minlon, LON *maxlon,
                              LAT *minlat, LAT *maxlat)
 where
         zone   Contains the TS zone the data lie within
       minlon   Contains the minimum segment longitude coordinate
       maxlon   Contains the maximum segment longitude coordinate
       minlat   Contains the minimum segment latitude coordinate
       maxlat   Contains the maximum segment latitude coordinate


4 DEFINE_BOXES_SEND
 When passed in a rectangle defined by minimum and maximum
 latitude/longitude coordinates, this function determines which
 zones the rectangle covers.  It creates little rectangles, for
 each zone and stores their latitude/longitude and row/column
 coordinates in separate two-dimensional arrays.  The following
 syntax is used to invoke define_boxes_send:

  void define_boxes_send (LON *minlon, LON *maxlon,
                          LAT *minlat, LAT *maxlat)
 where
       minlon   Contains the minimum segment longitude coordinate
       maxlon   Contains the maximum segment longitude coordinate
       minlat   Contains the minimum segment latitude coordinate
       maxlat   Contains the maximum segment latitude coordinate


4 GET_BITMAP_FROM_DISK
 Prompts user for a bitmap prefix name of a bitmap located in the
MDFF_SYSTEM:[BITMAPS] directory, reads in this bitmap, and returns
```

it to the calling point. The following syntax is used to invoke get_bitmap_from_disk:

```
BIT *get_bitmap_from_disk (SCALE *mapscale, ZONE *mapzone,
                           char *filename, COL *mncol,
                           COL *mxcol, ROW *mnrow, ROW *mxrow)
```

where

BIT	The returned bitmap
mapscale	Contains the chart scale
mapzone	Contains the TS zone the data lie within
filename	Contains the bitmap file name
mncol	Contains the minimum segment column number
mxcol	Contains the maximum segment column number
mnrow	Contains the minimum segment row number
mxrow	Contains the maximum segment row number

4 GET_COORDS

Prompts user for the latitude/longitude coordinates of the lower left corner and the upper right corner of a rectangle. The following syntax is used to invoke get_coords:

```
unsigned char get_coords (LON *minlon, LON *maxlon,
                          LAT *minlat, LAT *maxlat)
```

where

unsigned char	The return status value
minlon	Contains the minimum segment longitude coordinate
maxlon	Contains the maximum segment longitude coordinate
minlat	Contains the minimum segment latitude coordinate
maxlat	Contains the maximum segment latitude coordinate

4 MINMAX_INIT

Once minimum and maximum row/column values are determined, this function should be invoked to pass these values to other bitmap_appl routines. The following syntax is used to invoke minmax_init:

```
void minmax_init (ZONE *zone, COL *mncol, COL *mxcol,
                  ROW *mnrow, ROW *mxrow)
```

where

zone	Contains the TS zone the data lie within
mncol	Contains the minimum segment column number
mxcol	Contains the maximum segment column number
mnrow	Contains the minimum segment row number
mxrow	Contains the maximum segment row number

4 STORE_BOX_COORDINATES
Stores the row/column and latitude/longitude coordinates of the lower left and upper right corners of a defined rectangle into separate two-dimensional arrays. The following syntax is used to invoke store_box_coordinates:

```
void store_box_coordinates (ZONE zone)
```

where

zone Contains the TS zone the data lie within

2 BITMAP_ODI.C
Contains a suite of C language routines that create bitmaps from the MDFF_SCRATCH:[000000]ODI_BOUNDS.DAT file. The ODI_BOUNDS.DAT file is stored in the MDFF_SCRATCH:[000000] directory for the current processing thread. Subtopics include requirements and individual routines that are contained within the suite.

3 Include_Files
There are two files that must be included for use with BITMAP_ODI.C. Their names and a brief description follow.

V2_DIR:BITMAP_ODI.H	Contains data definitions used by subroutines within the suite.
V2_DIR:DATA_DEFS.H	Contains type definition for common variables (e.g., chart scale, zone)

The following subroutines are required for linkage. For additional information about each subroutine, see MDFFHELP under the main topic CAC_SOURCE_CODE.

BITMAP_APPL.C	A suite of high-level routines that perform complex bitmap application functions.
BITMAP_PROCS.C	A suite of low-level routines that perform a variety of basic bitmap operations.
LL_MAXMIN.C	A suite of routines that determine the true pair of minimum and maximum coordinates.
ODI_BOUNDS.C	NOT YET ADDED TO MDFFHELP
QUAD_PROCS.C	A suite of routines that compute the minimum and maximum latitude/longitude coordinates for polar data.
RC_MAXMIN.C	A suite of routines that determine the true pair of minimum and maximum row/column values from a set of row/column pairs.

3 Suite_Description
BITMAP_ODI.C contains the following subroutines:

4 BUILD_ODI_BOUNDS_BITMAP
When passed a scale and zone, this function builds a bitmap using the bounds from the ODI_BOUNDS.DAT file. The bitmap's minimum/maximum row/column values are returned and are set to accommodate the ODI bounds. The following syntax is used to invoke build_odi_bounds_bitmap:

```
BIT *build_odi_bounds_bitmap (SCALE *mapscale, ZONE *mapzone,
                              COL *mncol, COL *mxcol, ROW *mnrow,
                              ROW *mxrow)
```

where

BIT	The returned bitmap
mapscale	Chart scale (passed)
mapzone	TS zone number (passed)
mncol,mxcol	minimum & maximum column numbers (returned)
mnrow,mxrow	minimum & maximum row numbers (returned)

5 Example
The following code segment provides an example of usage.

```
BIT *map;              /* The bitmap     */
SCALE mapscale;        /* chart scale    */
ZONE  mapzone;         /* TS zone number */
ROW   minrow, maxrow; /* minimum & maximum row #s */
COL   mincol, maxcol; /* minimum & maximum column #s */

mapscale = 5;
mapzone  = 4;

/* After this call, map will be a pointer to a new   */
/* bitmap that has been created bounds to house the  */
/* odi for the zone requested (zone 4, in this case).*/
/* The minimum/maximum row/column values of the      */
/*  bitmap (map) will be returned.                   */

map = build_odi_bounds_bitmap2 (&mapscale, &mapzone,
                                &mincol,
                                &maxcol,
                                &minrow,
                                &maxrow);
```

4 BUILD_ODI_BOUNDS_BITMAP2
When passed a scale and zone, this function builds a bitmap using the bounds from the ODI_BOUNDS.DAT file. Additionally, these bounds may be modified by the user. Alternate bounds, determined by the user, can be used for the bitmap's minimum/maximum row/column values and must be passed to the module BITMAP_APPL.C

(see BITMAP_APPL.C) prior to invoking this routine. The following syntax is used to invoke build_odi_bounds_bitmap:

```
BIT *build_odi_bounds_bitmap2 (SCALE *mapscale, ZONE *mapzone)
```

where

BIT	The returned bitmap
mapscale	The chart scale (passed)
mapzone	The TS zone number (passed)

5 Example

The following code segment provides an example of usage.

```
            BIT *map;         /* the bitmap     */
            SCALE mapscale;   /* chart scale    */
            ZONE  mapzone;    /* TS zone number */
            ROW   minrow, maxrow; /* minimum & maximum row #s */
            COL   mincol, maxcol; /* minimum & maximum column #s */

            mapscale = 5;
            mapzone  = 4;

 /* These are the user-selected min/max row/col bitmap values */
            minrow   = 100;
            maxrow   = 125;
            mincol   = 150;
            maxcol   = 175;

 /* The min/max values are passed to the routine minmax_init  */
 /* (contained within the module BITMAP_APPL.C) to obtain a   */
 /* value for mapzone.  mapzone is an argument used by the    */
 /* build_odi_bounds_bitmap2 routine.                         */

      minmax_init (&mapzone, &mincol, &maxcol, &minrow, &maxrow);


       /* After this next call, map will be a pointer to the new */
       /* bitmap that has been created to house the odi bounds   */
       /* for the zone requested (zone 4, in this case).  Note,  */
       /* the minimum/maximum values of the bitmap (map) are the */
       /* same minimum/maximum values that were passed to the    */
       /* minmax_init routine. */


      map = build_odi_bounds_bitmap2 (&mapscale, &mapzone);
```

2 BITMAP_PROCS.C

Contains a suite of low-level C language routines that perform a variety of basic bitmap operations. Subtopics include requirements, individual routines within the suite, and an example of usage.

3 Requirements

4 Include_Files
The file, "V2_DIR:BITMAP_PROCS.H", contains data definitions that are used by suite routines and must be included in the source code.

4 Global_Variables
Global variables, which must be declared external (i.e., "extern"), include the following:

long maxrow, maxcol;	The maximum row and column values of data in the bitmap.
long minrow, mincol;	The minimum row and column values of data in the bitmap.
long total_bits;	Total number of bits in the bitmap.
long num_rows;	Number of rows in the bitmap.
long num_cols;	Number of cols in the bitmap.

3 Suite_Description
BITMAP_PROCS.C contains the following routines:

4 ADD_BUF_TO_BM
Adds two rows of clear bits around the bitmap. This is performed so that the routines used to traverse the bitmap do not have to check for bounds. The following syntax is used to invoke add_buf_to_bm:

```
void add_buf_to_bm (void)
```

4 BITMAP_INIT
Should be invoked before a bitmap is created. This function adds a two-position wide buffer to the minimum and maximum values, determines the number of rows and columns the bitmap will need in order to hold the data, and computes the total bits needed to construct the bitmap. The following syntax is used to invoke bitmap_init:

```
void bitmap_init (long *mnrow, long *mncol,
                  long *mxrow, long *mxcol)
```

where

long maxrow, maxcol;	The maximum row and column values of data in the bitmap.
long minrow, mincol;	The minimum row and column values of data in the bitmap.

4 CHECK_DOWN
Determines whether the bit, which is located below the bit passed in, is set. The following syntax is used to invoke check_down:

```
long check_down (BIT map[], long *bitrow, long *bitcol)
```

where

long	Return status that will possess one of the following values: FALSE if the above bit is set TRUE if the above bit is not set
BIT map[]	The bitmap
long bitrow	The bitmap's row value
long bitcol	The bitmap's column value

4 CHECK_DOWN_LEFT
Determines whether the bit, which is located below and to the left of the bit passed in, is set. The following syntax is used to invoke check_down_left:

```
long check_down_left (BIT map[], long *bitrow, long *bitcol)
```

where

long	Return status that will possess one of the following values: FALSE if the above bit is set TRUE if the above bit is not set
BIT map[]	The bitmap
long bitrow	The bitmap's row value
long bitcol	The bitmap's column value

4 CHECK_DOWN_RIGHT
Determines whether the bit, which is located below and to the right of the bit passed in, is set. The following syntax is used to invoke check_down_right:

```
long <check_down_right (BIT map[], long *bitrow, long *bitcol)
```

where

long	Return status that will possess one of the following values: FALSE if the above bit is set TRUE if the above bit is not set
BIT map[]	The bitmap
long bitrow	The bitmap's row value
long bitcol	The bitmap's column value

4 CHECK_LEFT
Determines whether the bit, which is located to the left of the bit passed in, is set. The following syntax is used to invoke check_left:

```
   long check_left (BIT map[], long *bitrow, long *bitcol)

  where
       long            Return status that will possess one of the
                       following values:
                          FALSE if the above bit is set
                          TRUE  if the above bit is not set
       BIT map[]       The bitmap
       long bitrow     The bitmap's row value
       long bitcol     The bitmap's column value

4 CHECK_RIGHT
 Determines whether the bit, which is located to the right of the
 bit passed in, is set.  The following syntax is used to invoke
 check_right:

   long check_right (BIT map[], long *bitrow, long *bitcol)

  where
       long            Return status that will possess one of the
                       following values:
                          FALSE if the above bit is set
                          TRUE  if the above bit is not set
       BIT map[]       The bitmap
       long bitrow     The bitmap's row value
       long bitcol     The bitmap's column value

4 CHECK_UP
 Determines whether the bit, which is located above the bit passed
 in, is set.  The following syntax is used to invoke check_up:

   long check_up (BIT map[], long *bitrow, long *bitcol)

  where
       long            Return status that will possess one of the
                       following values:
                          FALSE if the above bit is set
                          TRUE  if the above bit is not set
       BIT map[]       The bitmap
       long bitrow     The bitmap's row value
       long bitcol     The bitmap's column value

4 CHECK_UP_LEFT
 Determines whether the bit, which is located above and to the left
 of the bit passed in, is set.  The following syntax is used to
 invoke check_up_left:

   long check_up_left (BIT map[], long *bitrow, long *bitcol)

  where
       long            Return status that will possess one of the
                       following values:
```

```
                        FALSE if the above bit is set
                        TRUE  if the above bit is not set
      BIT map[]       The bitmap
      long bitrow     The bitmap's row value
      long bitcol     The bitmap's column value
```

4 CHECK_UP_RIGHT

Determines whether the bit, which is located above and to the right of the bit passed in, is set. The following syntax is used to invoke check_up_right:

```
long check_up_right (BIT map[], long *bitrow, long *bitcol)
```

where

```
      long            Return status that will possess one of the
                      following values:
                        FALSE if the above bit is set
                        TRUE  if the above bit is not set
      BIT map[]       The bitmap
      long bitrow     The bitmap's row value
      long bitcol     The bitmap's column value
```

4 CLEAR_BIT

Clears a bit in the bitmap. The bit is determined by the bitmap's row and column that are passed as arguments. The following syntax is used to invoke clear_bit:

```
void clear_bit (BIT map[], long *bitrow, long *bitcol)
```

where

```
      BIT map[]       The bitmap
      long bitrow     The bitmap's row value
      long bitcol     The bitmap's column value
```

4 CLEAR_BITMAP

Clears every bit contained within the bitmap. The following syntax is used to invoke clear_bitmap:

```
void clear_bitmap (BIT map[])
```

where

```
      BIT map[]       The bitmap
```

4 CLOSE_BITMAP_FILE

Closes a binary file that contains a bitmap. The following syntax is used to invoke close_bitmap_file:

```
void close_bitmap_file (long *filedesc)
```

where

```
      long filedesc    Binary file descriptor
```

4 CONVERT_BM_TO_RC

Uses bitmap row and column values to determine the equivalent row and column values of the original data. The following syntax is used to invoke convert_bm_to_rc:

```
void convert_bm_to_rc (long *bitrow, long *bitcol,
                       long *row, long *col)
```

where

long bitrow	The bitmap's row value
long bitcol	The bitmap's column value
long row	The original data's row value
long col	The original data's column value

4 CONVERT_RC_TO_BM

Uses original data row and column values to determine the equivalent bitmap row and column values. The following syntax is used to invoke convert_rc_to_bm:

```
void convert_rc_to_bm (long *row, long *col,
                       long *bitrow, long *bitcol)
```

where

long row	The original data's row value
long col	The original data's column value
long bitrow	The bitmap's row value
long bitcol	The bitmap's column value

4 COPY_BITMAP

Takes in a source bitmap and copies it to a destination bitmap. The following syntax is used to invoke copy_bitmap:

```
void copy_bitmap (BIT destination[], BIT source[])
```

where

BIT destination[]	The destination bitmap
BIT source[]	The source bitmap

4 CREATE_BITMAP

Returns a pointer to a bitmap by allocating the total number of bits needed to contain the data. A function to clear the bitmap is then called. The following syntax is used to invoke create_bitmap:

```
BIT *create_bitmap (void)
```

4 DESTROY_BITMAP

Releases memory, that has been reserved for the bitmap, back to the system. The following syntax is used to invoke destroy_bitmap:

```
void destroy_bitmap (BIT map[])
```

4 DUMP_BITMAP

Writes an ASCII representation of the bitmap into the specified file. The following syntax is used to invoke dump_bitmap:

```
void dump_bitmap (FILE *filedesc, BIT map[])
```

where

FILE filedesc	The file specification
BIT map[]	The bitmap

4 INDEX

When passed a valid bitmap row and column, this function returns an index to that row and column in the bitmap. The following syntax is used to invoke index:

```
long index (long *bitrow, long *bitcol)
```

where

long	returns the index value
long bitrow	bitmap row value
long bitcol	bitmap column value

4 IS_CLEAR

Returns TRUE if the bit, as determined by the bitmap row and column value passed in, is cleared. The following syntax is used to invoke is_clear:

```
long is_clear (BIT map[], long *bitrow, long *bitcol)
```

where

long	Returns the status, contains one of following values: TRUE if the bit is clear FALSE if the bit is not clear
BIT map[]	The bitmap
long bitrow	The bitmap's row value
long bitcol	The bitmap's column value

4 IS_SET

Returns TRUE if the bit, as determined by the bitmap row and column values passed in, is set. The following syntax is used to invoke is_set:

```
long is_set (BIT map[], long *bitrow, long *bitcol)
```

where

long	Returns the status, contains one of following values: TRUE if the bit is set FALSE if the bit is not set
BIT map[]	The bitmap
long bitrow	The bitmap's row value
long bitcol	The bitmap's column value

4 MERGE_BITMAPS

This function merges two bitmaps. The merged bitmap, specified as the destination, is returned. The bitmaps must be of the same dimension. The following syntax is used to invoke merge_bitmap:

```
void merge_bitmaps (BIT destination[], BIT source[])
```

where

BIT destination[]	One of the bitmaps to be merged and also the destination bitmap
BIT source[]	The other source bitmap to be merged

4 OPEN_BITMAP_FILE

Opens a binary file, in which a bitmap may be stored, and returns a file descriptor to the open file. The following syntax is used to invoke open_bitmap_file:

```
long open_bitmap_file (char filename[])
```

where

long	Returned open file descriptor
char filename	The name of the binary file

4 READ_IN_BITMAP

Reads a bitmap from the binary file that is defined by the file descriptor. Use the routine, open_bitmap_file, to open the binary file (see subtopic open_bitmap_file). The following syntax is used to invoke read_in_bitmap:

```
BIT *read_in_bitmap (long *filedesc)
```

where

BIT map[]	The bitmap to be read
long filedesc	Binary file descriptor

4 REMOVE_BUF_FROM_BM

Removes the two rows of clear bits (that were added by the function add_buf_to_bm) around the bitmap. The following syntax is used to invoke remove_buf_from_bm:

```
void remove_buf_from_bm (void)
```

4 SET_BIT

Sets a bit in the bitmap. The bit is determined by the bitmap's row and column that are passed as arguments. The following syntax is used to invoke set_bit:

```
void set_bit (BIT map[], long *bitrow, long *bitcol)
```

where

BIT map[]	The bitmap
long bitrow	The bitmap's row value

```
        long bitcol    The bitmap's column value

4 SET_BITMAP
 Sets every bit contained within the bitmap.  The following
 syntax is used to invoke set_bitmap:

   void set_bitmap (BIT map[])

  where
        BIT map[]      The bitmap

4 TOGGLE_BIT
 Toggles the state of a bit within the bitmap.  The bit is
 determined by the bitmap's row and column that are passed as
 arguments.  The following syntax is used to invoke toggle_bit:

   void toggle_bit (BIT map[], long *bitrow, long *bitcol)

  where
        BIT map[]      The bitmap
        long bitrow    The bitmap's row value
        long bitcol    The bitmap's column value

4 WRITE_OUT_BITMAP
 Writes a bitmap into the binary file that is defined by the file
 descriptor.  Use the routine, open_bitmap_file, to open the binary
 file (see subtopic open_bitmap_file).  The following syntax is
 used to invoke write_out_bitmap:

   void write_out_bitmap (long *filedesc, BIT map[])

  where
        long filedesc    Binary file descriptor
        BIT  map[]       The bitmap to be written

3 Example
 The following C language program provides examples of usage.

 #include "bitmap_procs.h"
 #include "v2_dir:map_dir_procs.h"

 BIT *bitmap;
 struct coord POINTS [MAX_SEG];

 main ()
 {
  long i;
  long count;            /* Number of Segments in a zone.    */
  long bitrow, bitcol;   /* Actual row/col index in bitmap.  */
  FILE *fp;              /* File where ASCII bitmap will be  */
                         /* dumped.                          */
  long filedesc;         /* File descriptor of bitmap        */
```

```
                              /* memory file.                          */
 long scale, zone;

 long mncol, mnrow, mxcol, mxrow; /* Min/Max values of data to */
                                  /* be placed in the bitmap.  */

 char ascii_filename[]  = "bit.out"; /* ASCII Dump of bitmap.  */
 char memory_filename[] = "mem.out"; /* Memory Dump of bitmap. */

/************************************************/
/* Enter Scale and Zone to be placed in bitmap */
/************************************************/
 scale = 3;
 zone = 2;

/************************************************/
/* Open the ASCII bitmap file.                  */
/************************************************/
 if ((fp = fopen (ascii_filename, "w")) == NULL)
 {
   printf ("ERROR:  Opening output file\n");
   exit (0);
 }

/************************************************/
/* Place all segments in a array of records.    */
/************************************************/
 count = 0;
 count = plot_segments (POINTS, zone);

/************************************************/
/* Find Max/Min values for data.                */
/************************************************/
 rc_maxmin_init (&scale, &zone);

 for (i=0;i<count;i++)
   rc_maxmin_send ((&(POINTS[i].row)), (&(POINTS[i].col)));

 rc_maxmin_ret (&mncol, &mxcol, &mnrow, &mxrow);

/************************************************/
/* Initialize the variables the bi' -p needs    */
/* and create a cleared bitmap with enough      */
/* memory allocated to hold all segments in     */
/* in the given zone and a two row/col buffer   */
/* of clear bits.                               */
/************************************************/
 bitmap_init (&mnrow, &mncol, &mxrow, &mxcol);
 bitmap = create_bitmap ();

/************************************************/
/* For each segment in the array of records,    */
```

```
/* determine the bit row and bit index into    */
/* the bitmap and set that bit.                */
/*********************************************/
  for (i=0;i<count;i++)
  {
    convert_rc_to_bm ((&(POINTS[i].row)), (&(POINTS[i].col)),
                      &bitrow, &bitcol);

    set_bit (bitmap, &bitrow, &bitcol);
  }

/*********************************************/
/* Now that the bitmap has been created and    */
/* filled, open a bitmap file and write the    */
/* bitmap to disk. Close the bitmap file when  */
/* finished.                                   */
/*********************************************/
  filedesc = open_bitmap_file (memory_filename);
  write_out_bitmap (&filedesc, bitmap);
  close_bitmap_file (&filedesc);

/*********************************************/
/* Now that the bitmap has been saved, return  */
/* bitmap's memory back to the system.         */
/*********************************************/
  destroy_bitmap    (bitmap);

/*********************************************/
/* Read in the bitmap from the memory file.    */
/*********************************************/
  filedesc = open_bitmap_file (memory_filename);
  bitmap   = read_in_bitmap (&filedesc);
  close_bitmap_file (&filedesc);

/*************************************************/
/* Dump the bitmap to the ASCII file and close it */
/*************************************************/
  dump_bitmap (fp, bitmap);
  fclose (fp);      /* ASCII Bitmap Dump File */

  return;
}
```

2 BITMAP_SEGMENTSDAT.C
Contains a suite of C language routines that build bitmaps from the SEGMENTS.DAT file. The SEGMENTS.DAT file is defined for the current processing thread. Subtopics include requirements and individual routines within the suite.

3 Include_Files
The following file must be included for use with

BITMAP_SEGMENTSDAT.C:

V2_DIR:DATA_DEFS.H	Contains type definition for common variables (e.g., scale, zone)

The following subroutines are required for linkage. For additional information about each subroutine, see MDFFHELP under the main topic CAC_SOURCE_CODE.

BITMAP_APPL.C	A suite of high-level routines that perform a variety of complex bitmap operations.
BITMAP_PROCS.C	A suite of low-level routines that perform a variety of basic operations on a bitmap.
LL_MAXMIN.C	A suite of routines that determine the true pair of minimum and maximum coordinates.
QUAD_PROCS.C	A suite of routines that compute the minimum and maximum latitude/longitude coordinates for polar data.
RC_MAXMIN.C	A suite of routines that determine the true pair of minimum and maximum row/column values from a set of row/column pairs.

3 Suite_Description

BITMAP_SEGMENTSDAT.C contains the following subroutines:

4 BUILD_SEGMENTSDAT_BITMAPS

Converts each zone within the SEGMENTS.DAT file to a bitmap and places pointers to these bitmaps in an array. The array is dimensioned from 0 to (number of zones - 1). If a zone is not present within the SEGMENTS.DAT file, the array position for that zone will be NULL. The following syntax is used to invoke build_segmentsdat_bitmaps:

```
void build_segmentsdat_bitmaps (SCALE *mapscale,
                                BIT *coverage[NUM_ZONES])
```

where

BIT	The Bitmap for the specified scale and zone (returned)
mapscale	Contains the chart scale
coverage[NUM_ZONES]	Contains the bitmap for the area of coverage (returned)

5 Example

The following code segment provides an example of usage.

```
   BIT    maps[NUM_ZONES];
 SCALE    scale;

 scale = 4;

 build_segmentsdat_bitmaps (&scale, maps);

/* If the SEGMENTS.DAT file contains two zones, for example */
/* 2 and 3, the array (maps) will look like this: */

  maps[0] = NULL
  maps[1] = NULL
  maps[2] = (some address to a bitmap containing zone 2 data)
  maps[3] = (some address to a bitmap containing zone 3 data)
  maps[4] = NULL
```

4 COVERAGE_FROM_SEGMENTSDAT

Returns a bitmap of the data in the SEGMENTS.DAT file for a specified scale and zone. The minimum/maximum row/column values of the bitmap are returned. The following syntax is used to invoke coverage_from_segmentsdat:

```
BIT *coverage_from_segmentsdat (SCALE *mscale, ZONE *zone
                                COL *mncol, COL *mxcol,
                                ROW *mnrow, ROW *mxrow)
```

Where

BIT	The Bitmap for the specified scale and zone (returned)
mscale	Contains the chart scale (passed)
zone	Contains a TS zone (passed)
mncol,mxcol	Contains minimum and maximum column values (returned)
mnrow,mxrow	Contains minimum and maximum row values (returned)

5 Example

The following code segment provides an example of usage.

```
   BIT    *map;
 SCALE    scale;
  ZONE    zone;

 scale = 4;
 zone  = 3;

 /* This invocation will return a bitmap of the data in the     */
 /* SEGMENTS.DAT file for a specified scale and zone.  The      */
 /* minimum/maximum row/column values of the bitmap are returned.*/
```

```
map = coverage_from_segmentsdat (&scale, &zone, &mincol, &maxcol,
                                 &minrow, &maxrow);
```

2 BITMAP_SOURCE.C
Contains a suite of C language routines that build bitmaps from downsampled and compressed segment data. Subtopics include requirements and individual routines within the suite.

3 Include_Files
The following files must be included for use with BITMAP_SOURCE.C:

V2_DIR:BITMAP_SOURCE.H	Contains data definitions used by the subroutines.
V2_DIR:DATA_DEFS.H	Contains type definitions for common variables (e.g., scale, zone)

The following routines are required for linkage. For additional information about each subroutine, see MDFFHELP main topic CAC_SOURCECODE.

BITMAP_APPL.C	A suite of high-level routines that perform a variety of complex bitmap operations.
BITMAP_PROCS.C	A suite of low-level routines that perform a variety of basic operations on a bitmap.
LL_MAXMIN.C	A suite of routines that determine the true pair of minimum and maximum coordinates.
QUAD_PROCS.C	A suite of routines that compute the minimum and maximum latitude/longitude coordinates for polar data.
RC_MAXMIN.C	A suite of routines that determine the true pair of minimum and maximum row/column values from a set of row/column pairs.

3 Suite_Description
BITMAP_SOURCE.C contains the following subroutines:

4 BITMAP_DS_SOURCE
Is passed a device name that contains downsampled data (i.e. CHART_SEGMENTS:) and builds a bitmap of this data. The bitmap, built with the minimum and maximum row/column values that were also passed as arguments, is returned. The following syntax is used to invoke bitmap_ds_source:

```
BIT *bitmap_ds_source (char *s,   SCALE *mscale, ZONE *zone,
                       COL *mncol, COL *mxcol,
                       ROW *mnrow, ROW *mxrow)
```

where

BIT	The returned bitmap
s	Contains the device name (passed)
mscale	Contains the map scale (passed)
zone	Contains the TS zone number (passed)
mncol	Contains the minimum column number (passed)
mxcol	Contains the maximum column number (passed)
mnrow	Contains the minimum row number (passed)
mxrow	Contains the maximum row number (passed)

4 BITMAP_MAP_SOURCE

Is passed a device name (i.e., CHART_ODI_DISK: or CDROM01:), and builds a bitmap of the data that are contained on this device. The bitmap, having the minimum and maximum row/column values that were passed as arguments, is returned. The following syntax is used to invoke bitmap_map_source:

```
BIT *bitmap_map_source (char *device, SCALE *mscale,  ZONE *zone,
                        COL *mncol,     COL *mxcol,
                        ROW *mnrow,     ROW *mxrow)
```

where

BIT	The returned bitmap
device	Contains the device name (passed)
mscale	Contains the map scale (passed)
zone	Contains the TS zone number (passed)
mncol	Contains the minimum column number (passed)
mxcol	Contains the maximum column number (passed)
mnrow	Contains the minimum row number (passed)
mxrow	Contains the maximum row number (passed)

5 Example

The following code segment provides an example of usage.

```
/* path to data to be placed in bitmap. */
```

```
 path = "CDROM01:";

/* call this first....located in CAC_UTIL.C. */
 cac_init (path);

/* Get scale and zone. */
 scale = cac.map_scale;

/* Get the minimum and maximum row/col values of the data. */
 get_minmax_from_cacid (&zone, &mncol, &mxcol, &mnrow, &mxrow);

/* Return (i.e., create) a bitmap that is named map. */
 map  = bitmap_map_source (path,   &scale, &zone,
                           &mncol, &mxcol,
                           &mnrow, &mxrow);
```

4 GET_MINMAX_FROM_CACID

Extracts the minimum and maximum row/col values from a CAC CD-ROM. The function "cac_init" (see subtopic CAC_UTIL.C) must be invoked prior to use of this function. The following syntax is used to invoke get_minmax_from_cacid:

```
void get_minmax_from_cacid (short *zone,
                            COL *mncol, COL *mxcol,
                            ROW *mnrow, ROW *mxrow)
```

where

zone	Contains the TS zone number (passed)
mncol	Contains the minimum column number (returned)
mxcol	Contains the maximum column number (returned)
mnrow	Contains the minimum row number (returned)
mxrow	Contains the maximum row number (returned)

5 Example

The following code segment provides an example of usage.

```
/* path to data to be placed in bitmap. */
 path = "CDROM01:";

/* call this first....located in CAC_UTIL.C. */
 cac_init (path);

/* Get scale and zone. */
 scale = cac.map_scale;

/* Get the minimum and maximum row/col values of the data. */
 get_minmax_from_cacid (&zone, &mncol, &mxcol, &mnrow, &mxrow);
```

```
/* Return (i.e., create) a bitmap that is named map. */
 map  = bitmap_map_source (path,   &scale, &zone,
                           &mncol, &mxcol,
                           &mnrow, &mxrow);
```

4 GET_MINMAX_FROM_DS

Is passed a device name where downsample segments are housed (e.g., CHART_SEGMENTS:) and returns the minimum and maximum row/col values of the data. The following syntax is used to invoke get_minmax_from_ds:

```
void get_minmax_from_ds (char *device, SCALE *mscale, ZONE *zone,
                         COL *mncol,    COL *mxcol,
                         ROW *mnrow,    ROW *mxrow)
```

where

device	Contains the device name (passed)
mscale	Contains the map scale (passed)
zone	Contains the TS zone number (passed)
mncol	Contains the minimum column number (returned)
mxcol	Contains the maximum column number (returned)
mnrow	Contains the minimum row number (returned)
mxrow	Contains the maximum row number (returned)

4 GET_MINMAX_FROM_MAP

Is passed a device name (i.e., CHART_ODI_DISK: or CDROM01:), and returns the minimum and maximum row/col values of the data that are contained in the MAP Directory. The following syntax is used to invoke get_minmax_from_map:

```
void get_minmax_from_map (char *device, SCALE *mscale, ZONE *zone,
                          COL *mncol,     COL *mxcol,
                          ROW *mnrow,     ROW *mxrow)
```

where

device	Contains the device name (passed)
mscale	Contains the map scale (passed)
zone	Contains the TS zone number (passed)
mncol	Contains the minimum column number (returned)
mxcol	Contains the maximum column number (returned)
mnrow	Contains the minimum row number

(returned)
mxrow Contains the maximum row number
(returned)

2 BITMAP_TRANS.C
Combines two or more differently sized bitmaps into one bitmap. The bitmaps that are to be combined must be stored on disk.

BITMAP_TRANS.C contains three subroutines. In order to work correctly, all three routines must be called in proper order.

3 Include_Files
The following files must be included for use with BITMAP_TRANS.C:

MDFFSCR:BITMAP_TRANS.H Contains data definitions used by the subroutines.
MDFFSCR:DATA_DEFS.H Contains type definition for common variables (e.g., scale, zone)

The following subroutines are required for linkage. For additional information about each subroutine, see MDFFHELP under the main topic CAC_SOURCE_CODE.

BITMAP_APPL.C A suite of high-level routines that perform a variety of complex bitmap operations.

RC_MAXMIN.C A suite of routines that determine the true pair of minimum and maximum row/column values from a set of row/column pairs.

BITMAP_PROCS.C A suite of low-level routines that perform a variety of basic operations on a bitmap.

3 Example
The following pseudocode provides an example correct usage.

```
call BITMAP_TRANS_INIT (scale, zone) ! This sets up the variables
                                     ! used by the next two calls.
                                     ! This routine MUST be called
                                     ! first. Scale and zone are
                                     ! INTEGER*4 and passed by
                                     ! reference.

! Loop through the number of bitmaps that are to be combined into
! one bitmap

 LOOP 1 TO Number_Of_Bitmaps
```

```
      ! Send in as many bitmap filenames as you like.
      ! The filename must include the complete path.
      ! Filename is a character string pointer and is
      ! passed by reference.

      call BITMAP_TRANS_SEND (filename)

  END LOOP

 ! This is the final routine and MUST be called last.  It returns
 ! the one combined bitmap and its minimum/maximum row/column
 ! values.  Arguments are passed by reference

  bitmap = bitmap_trans_ret (mincol, maxcol, minrow, maxrow)
```

3 Suite_Description
BITMAP_TRANS.C contains the following subroutines:

4 BITMAP_TRANS_INIT
This routine must be invoked first. It is used to initialize variables used by the other routines. The following syntax is used to invoke BITMAP_TRANS_INIT:

```
 void bitmap_trans_init (SCALE *mapscale, ZONE *mapzone)
```

where

mapscale	INTEGER*4	Contains the chart (i.e., map) scale (passed by reference)
mapzone	INTEGER*4	Contains a TS zone (passed by reference)

4 BITMAP_TRANS_SEND
This routine is used to specify filenames of the bitmaps that are to be combined. Hence, it should be invoked iteratively; each of these bitmaps will be combined to form one larger bitmap. The bitmap filenames must include the complete path specification (i.e., device and directory names). The following syntax is used to invoke BITMAP_TRANS_SEND:

```
  void bitmap_trans_send (char *filename)
```

where

filename	contains a character string pointer (passed by reference)

4 BITMAP_TRANS_RET
This is the final routine and MUST be called last. It returns the one combined bitmap and its minimum and maximum row/column values.

The following syntax is used to invoke BITMAP_TRANS_RET:

```
BIT *bitmap_trans_ret (COL *mncol, COL *mxcol,
                       ROW *mnrow, ROW *mxrow)
```

where

mncol,mxcol	Contains the minimum and maximum column values (returned)
mnrow, mxrow	Contains the minimum and maximum row values (returned)

2 BUILD_CD_ID.C

---------- TO BE ADDED LATER ----------

2 CAC.C

CAC.C contains a suite of C language routines that provide portable support for reading CAC CD-ROMs. Individual routines include:

CAC_INIT:	Initializes the CAC retrieval software.
CAC_INQ_PALETTE:	Returns the "day" or "night" color palette for current palette id.
CAC_GET_LL:	Returns the color of the pixel at the specified latitude and longitude. Also returns the address of the entire decompressed segment, if desired.
CAC_GET_RC:	Returns the address of the entire decompressed segment specified by the row, column, and map zone.
BUFFER_COMPRESSED_SEGMENT:	Low level routine used by "CAC_GET_LL" and "CAC_GET_RC". This routine SHOULD NOT be called by users at a high level! See MAIN_LL.C and MAIN_RC.C for examples on implementation of CAC reader software.

Subtopics provide more detailed descriptions of each routine within the suite.

3 CAC_INIT

Reads the [ID]CD_ID.DAT and [ID]CD_COVRG.DAT files from the specified device. Initializes the internal CAC work structure based on the contents of the [ID]CD_ID.DAT and [ID]CD_COVRG.DAT files.

4 Invocation

CAC_INIT is invoked with the following syntax:

```
short CAC_INIT (char cac_device[])
```

Where

cac_device: Name of device that CAC CD-ROM is loaded on.
(passed, char[])

CAC_INIT returns one of the following status values:

Status:	Meaning
1 :	Normal
-1 :	Error reading [ID]CD_ID.DAT
-2 :	Error reading [ID]CD_COVRG.DAT
-3 :	CDROM is NOT a CAC CDROM

3 CAC_INQ_PALETTE

Returns the color palette for the specified PA ID. Reads the color palette file for the specified palette ID. The color palette size is returned along with three arrays containing the red, green, and blue components of the specified color palette. In addition, the "day" or "night" color palette may be returned.

4 Invocation

CAC_INQ_PALETTE is invoked with the following syntax:

```
short CAC_INQ_PALETTE (char type,
                       short palid,
                       short *size,
                       byte red[],
                       byte green[],
                       byte blue[])
```

Where

type: Type of palette to load (DAY or NIGHT)
(passed, char)

palid: Palette identification. This is a four digit number identifying the color palette to use for the selected segment.
(passed, int)

size: Size of the color palette returned.
(returned, short *)

red: Array of size "size" containing the RED component of the color palette.
(returned, char [])

green: Array of size "size" containing the RED component of the color palette.
(returned, char [])

blue: Array of size "size" containing the RED component of the color palette.
(returned, char [])

CAC_INQ_PALETTE returns one of the following status values:

Status:	Meaning
1 :	Normal
-1 :	Error opening PALETTE.DAT file
-2 :	Error reading PALETTE.DAT file

3 CAC_GET_LL

Returns the value of the pixel at the specified latitude/longitude position. Also supplies a pointer to the entire decompressed segment if requested.

4 Invocation

CAC_GET_LL is invoked with the following syntax:

```
short CAC_GET_LL (float lon,
                  float lat,
                  short *palid,
                  short *color)
```

Where:

lon: Longitude of requested pixel.
(passed, float)

lat: Latitude of requested pixel.
(passed, float)

palid: Palette identification of pixel at lat/lon.
(returned, short *)

color: Pixel value at specified lat/lon. This is the index into the color palette.
(returned, short *)

CAC_GET_LL returns one of the following status values:

Status:	Meaning
1:	Normal
-1:	Specified lat/lon does NOT fall with bounds specified in the CD_COVRG.DAT file. The data is NOT on this CD-ROM.

3 CAC_GET_RC

Returns the decompressed segment at the specified row/column. The map zone is required in order to process zone overlap correctly.

4 Invocation

CAC_GET_RC is invoked with the following syntax:

```
short CAC_GET_RC (long row,
                  long col,
                  short  map_zone,
                  short  *palid)
```

Where

row: Row of requested segment.
(passed, long)

col: Column of requested segment.
(passed, long)

map_zone: TS map zone that the requested segment is in. This is used to allow specifying segments in zone overlap areas.
(passed, short)

palid: Palette identification of segment at row/column.
(returned, short *)

CAC_GET_RC returns one of the following status values:

Status:	Meaning
1:	Normal
-1:	Specified map zone is NOT on this CDROM.
-2:	Specified segment at row/column is NOT on this CD-ROM.

3 BUFFER_COMPRESSED_SEGMENT

Performs the reading and decompression of a segment. Low level routine used by "cac_get_11" and "cac_get_rc" to decompress a segment. This routine is NOT user callable.

4 Invocation

BUFFER_COMPRESSED_SEGMENT is invoked with the following syntax:

```
short BUFFER_COMPRESSED_SEGMENT()
```

There are NO arguments. All information to read and decompress a segment is in the structure "CAC".

BUFFER_COMPRESSED_SEGMENT returns one of the following status values:

Status:	Meaning
1:	Normal

2 CAC_MISC.C

Contains low-level CAC reader software that is written in C programming language. Most users should not require these routines: the high-level CAC reader routines (see subtopic

CAC_UTIL) will be sufficient for most applications.

3 Include_files
The following files must be included in source code.

#include <stdio.h>	Standard C I/O library
#include "ansi.h"	Enables software portability to the VAX/VMS platform
#include "sysdep.h"	Enables software portability to the VAX/VMS platform
#include "sysutil.h"	Enables software portability to the VAX/VMS platform
#include "m4_const.h"	TS-specific definitions
#include "cac.h"	CAC-specific definitions
#include "areasorc.h"	Structure for data in the [ID]AREASORC.DAT file
#include "areadrc.h"	Structure for data in the [ID]AREADRC.DAT file
#include "cd_header.h"	Structure for data in the [MAPx.CDxxxxx]HEADER.DAT file
#include "dr_header.h"	Structure for data in the [MAPx.CDxxxxx.TPCxxxxx]HEADER.DAT file
#include "sg_header.h"	Structure for data in the [MAPx.CDxxxxx.TPCxxxxx]SGHED.DATfile
#include "pa.h"	Palette area and data from CD_COVRG.DAT file

3 READ_AREADRC
Reads the contents of the specified AREADRC.DAT file. The contents are read into the structure pointed to by "areadrc".

4 Invocation
Read_areadrc is invoked using the following syntax:

```
short read_areadrc (char path[], structr areadrc *areadrc,
                    short *numpas)
```

where

path: Complete file specification of the AREADRC.DAT file.
(char [], passed)

areadrc: Structure to contain data read from AREADRC.DAT file.
(struct areadrc *, returned)

numpas: Number of PA areas (zones) in the AREADRC.DAT file.
(short *, returned)

4 Returns
Read_areadrc returns a file access status containing one of the following values:

Value	Meaning
1	Normal termination
-1	Error opening AREADRC.DAT file.
-2	Error reading AREADRC.DAT file.

(returned, short)

3 READ_AREASORC
Reads the contents of the specified AREASORC.DAT file. The contents are read into the structure pointed to by "areasorc".

4 Invocation
Read_areasorc is invoked using the following syntax:

```
short read_areasorc (char path[], structr areasorc *areasorc,
                     short *numpas)
```

where

path: Complete file specification of the AREASORC.DAT file.
(char [], passed)

areasorc: Structure to contain data read from AREASORC.DAT file.
(struct areasorc *, returned)

numpas: Number of PA areas (zones) in the AREASORC.DAT file.
(short *, returned)

4 Returns
Read_areasorc returns a file access status containing one of the following values:

Value	Meaning
1	Normal termination
-1	Error opening AREASORC.DAT file.
-2	Error reading AREASORC.DAT file.

(returned, short)

3 READ_CDHEADER
Reads the contents of the specified CDHEADER.DAT file. The contents are read into the structure pointed to by "cdheader".

4 Invocation
Read_cdheader is invoked using the following syntax:

```
short read_cdheader (char path[], structr cdheader *cdheader,
                     short *numpas)
```

where

path: Complete file specification of the CDHEADER.DAT file.
(char [], passed)

cdheader: Structure to contain data read from CDHEADER.DAT file.
(struct cdheader *, returned)

4 Returns
Read_cdheader returns a file access status containing one of the following values:

Value	Meaning
1	Normal
-1	Error opening CDHEADER.DAT file.
-2	Error reading CDHEADER.DAT file.

(returned, short)

3 READ_DRHEADER
Reads the contents of the specified DRHEADER.DAT file. The contents are read into the structure pointed to by "drheader".

4 Invocation
Read_drheader is invoked using the following syntax:

```
short read_drheader (char path[], structr drheader *drheader,
                     short *numpas)
```

where
path: Complete file specification of the DRHEADER.DAT file.
(char [], passed)

drheader: Structure to contain data read from DRHEADER.DAT file.
(struct drheader *, returned)

4 Returns
Read_drheader returns a file access status containing one of the following values:

Value	Meaning
1	Normal termination
-1	Error opening DRHEADER.DAT file.
-2	Error reading DRHEADER.DAT file.

(returned, short)

3 READ_SGHEADER
Reads the contents of the specified SGHEADER.DAT file. The contents are read into the structure pointed to by "sgheader".

4 Invocation
Read_sgheader is invoked using the following syntax:

```
short read_sgheader (char path[], structr sgheader *sgheader,
                     short *numpas)
```

where
path: Complete file specification of the SGHEADER.DAT file.
(char [], passed)

sgheader: Structure to contain data read from SGHEADER.DAT file.
(struct sgheader *, returned)

4 Returns
Read_sgheader returns a file access status containing one of the following values:

Value	Meaning
1	Normal termination
-1	Error opening SGHEADER.DAT file.
-2	Error reading SGHEADER.DAT file.

(returned, short)

3 FILE_OPEN_ERROR
Prints a file open error message and returns an error status (whose value is -1). File_open_error is invoked using the following syntax:

```
static short file_open_error (char path[])
```

where

```
char message[80] The error message
```

3 FILE_READ_ERROR
Prints a file read error message and returns an error status (whose value is -2). File_read_error is invoked using the following syntax:

```
static short file_read_error(char path[])
```

where

```
char message[80] The error message
```

2 CAC_UTIL.C
A suite of high-level C language utilities for reading CAC CD-ROMs. See Overview for brief descriptions of each routine.

See subtopics MAIN_LL.C and MAIN_RC.C for implementation examples of CAC reader software.

3 Overview
The suite of C language utilities, with brief descriptions, include:

DECODE_KEY: Converts "key" name to row/column values.

DECOMPRESS_SEGMENT: Reads and decompress the specified segment.

DOUBLE_TO_SI: Converts a double precision number to a scaled integer number.

ENCODE_KEY: Converts row/column values to "key" name.

EQ2POL: Rotates equatorial latitude and longitude

to the polar zone.

GET_DECOMPRESSED_PIXEL: Retrieves specified pixel from a compressed segment.

GET_SEGMENT_NAME: Builds the CAC compressed segment path name.

INIT_MEM: Initializes memory required to buffer compressed segment data.

LATLON_CALC: Convert row and column values to latitude and longitude.

LOAD_LEGEND_DATA: Reads header, palette, and image files for specified legend data.

ODD: Determines if a number is even or odd.

POL2EQ: Rotates polar latitude and longitude to the equatorial zone.

RC_CALC: Converts latitude and longitude to row and column values.

READ_CD_COVRG: Reads the contents of the specified CD_COVRG.DAT file.

READ_CD_ID: Reads the CD_ID.DAT file from the CD-ROM.

READ_COMPRESSED_SEGMENT: Reads the compressed segment and its codebook.

READ_PA_COVERAGE: Reads the PA coverage file (COVERAGE.DAT).

READ_PALETTE: Read the specified color palette.

SI_CONVERT: Converts an ASCII string to a scaled integer number.

SI_TO_DOUBLE: Converts scaled integer numbers to double precision numbers.

SPDEC: Decompresses CAC data.

3 DECODE_KEY

Decodes the key name for downsampled and compressed segments into its row and column components.

4 Invocation

DECODE_KEY is invoked using the following syntax:

```
   void decode_key (key, row, col)

  Where
          key: Downsampled segment key name
               (passed unsigned long)

          row: Downsampled segment row number
               (returned long)

          col: Downsampled segment column number
               (returned long)

4 Returns
 DECODE_KEY returns the downsampled segments row and column numbers
 through the following arguments:

          row: Downsampled segment row number
               (returned long)

          col: Downsampled segment column number
               (returned long)


3 DECOMPRESS_SEGMENT
 Reads a compressed segment and its codebook and then decompresses
 the segment.  A pointer to the beginning of the decompressed
 segment is returned.

4 Invocation
  DECOMPRESS_SEGMENT is invoked using the following syntax:

       short decompress_segment (char pa_path[], unsigned char
                                 *decomp_seg)

   Where
         File access status is returned through a short variable.

          pa_path: Complete file specification of CAC segment
                   file to decompress.
                   (passed char [])

       decomp_seg: Pointer to the beginning of the array containing
                   the decompressed segment data.
                   (returned unsigned char)

4 Returns
 DECOMPRESS_SEGMENT returns

       File access status containing one of the following values:
          Value  Meaning
            1    Normal
           -1    Error opening compressed CAC segment file.
```

-2 Error reading compressed CAC segment codebook.
-3 Error reading compressed CAC segment data.
(returned short)

decomp_seg: Pointer to the beginning of the array containing the decompressed segment data.
(returned unsigned char)

3 DOUBLE_TO_SI
Converts a double precision number to a 32-bit scaled integer number. Hence, this routine reduces the precision of the data.

4 Invocation
DOUBLE_TO_SI is invoked using the following syntax:

double double_to_si (double value)

Where:
The scaled integer is returned through a 32-bit (double) variable.

value: The double precision value to be converted.
(passed double)

3 ENCODE_KEY
Encodes the key name for downsampled and compressed segment files.

4 Invocation
ENCODE_KEY is invoked using the following syntax:

unsigned long encode_key (row, col)

Where
The key name is returned through an unsigned long variable.

row: Segment row number
(passed long)

col: Segment column number
(passed long)

3 EQ2POL
Rotates equatorial latitude and longitude coordinates into polar zone coordinates.

4 Invocation
EQ2POL is invoked using the following syntax:

void eq2pol (double *dlatin, double *dlngin,

```
                double *dlatout, double *dlngout,
                short *zone)
 Where
      dlatin: Segments equatorial latitude coordinate.
              (passed double)

      dlngin: Segment's equatorial longitude coordinate.
              (passed double)

     dlatout: Segment's rotated polar latitude coordinate.
              (returned double)

     dlngout: Segment's rotated polar longitude coordinate.
              (returned double)

        zone: The polar zone number.
              (passed short)

4 Returns
 EQ2POL returns the rotated coordinate values through the following
 arguments:

     dlatout: Segment's rotated polar latitude coordinate.
              (returned double)
     dlngout: Segment's rotated polar longitude coordinate.
              (returned double)


3 GET_DECOMPRESSED_PIXEL
 Retrieves specified pixel from a compressed segment.

4 Invocation
 GET_DECOMPRESSED_PIXEL is invoked using the following syntax:

      short get_decompressed_pixel(short y, short x)

  Where
         The pixel value is returned through a short variable.

         y: Y Coordinate in the decompressed segment
            (passed short)

         x: X coordinate in the decompressed segment
            (passed short)

4 Returns
  GET_DECOMPRESSED_PIXEL returns the specified pixel from
  the decompressed segment as a short variable.


3 GET_SEGMENT_NAME
 Builds the CAC compressed segment path name from the palette area
```

```
directory name, row number, column number, and zone of the
requested segment.

4 Invocation
  GET_SEGMENT_NAME is invoked using the following syntax:

 void get_segment_name (char pa_path[], long row, long col,
                        short zone, char seg_path[])

  Where
    pa_path: Path to the palette area subdirectory.  Note the
             "period" at the end of the VMS path name.
             (i.e., for   VMS: CDROM:[MAP3.PA012901.)
             (i.e., for  UNIX: /cdrom/map3/pa012901/)
             (i.e., for MSDOS: D:\map3\pa012901\)
             (passed char [])

         row: Row number of segment to decompress.
              (passed long)

         col: Column number of segment to decompress.
              (passed long)

        zone: Tesselated Sphere zone number corresponding to
              "pa_path".
              (passed short)

    seg_path: Complete path specification for requested segment.
           (i.e., for   VMS:
                      CDROM:[MAP3.PA012901.R000015]12345678.214)
           (i.e., for  UNIX:
                      /CDROM/MAP3/PA012901/R000015/12345678.214)
           (i.e., for MSDOS: D:\MAP3\PA012901\R000015\12345678.214)

             (returned char [])

4 Returns
  GET_SEGMENT_NAME returns the complete path specification,
  "seg_path",  for the requested segment.

    seg_path: Complete path specification for requested segment.
             (ie. for VMS:
                      CDROM:[MAP3.PA012901.R000015]12345678.214)
             (ie. for UNIX:
                      /CDROM/MAP3/PA012901/R000015/12345678.214)
             (ie. for MSDOS:
                      D:\MAP3\PA012901\R000015\12345678.214)

             (returned char [])


3 INIT_MEM
```

Initializes the memory required to buffer compressed segment data. This routine should only be executed once.

The number of CAC compressed segments that may be buffered at one time is controlled by #define MAX_SEGS_IN_BUF (which is defined in the file CAC.H). The structure element "mem_init", within the structure "cac" (also defined in CAC.H), is set when this routine terminates.

4 Invocation
INIT_MEM is invoked using the following syntax:

```
init_mem()
```

Note that there are no arguments or return values.

3 LATLON_CALC
Calculates latitude and longitude coordinates from row and column values. The zone is required for handling overlap areas.

4 Invocation
LATLON_CALC is invoked using the following syntax:

```
void latlon_calc (short *zone, short *scale, long *row,
                  long *col, double *rlatp, double *rlonp)
```

Where

zone : TS zone number to be used in the conversion.
(passed short integer)

scale: Map scale.
(passed short integer)

row: TS segment row number to convert.
(passed long)

col: TS segment column number to convert.
(passed long)

rlatp: Latitude coordinate based on zone, scale row, col
(returned double)

rlonp: Longitude coordinate based on zone, scale row, col
(returned double)

4 Returns
LATLON_CALC returns the segment's latitude and longitude coordinates through the following arguments:

rlatp: Segment's latitude coordinate
(returned double)

rlonp: Segment's longitude coordinate
(returned double)

3 LOAD_LEGEND_DATA
Reads header, palette, and image files for the specified legend data. A pointer to the beginning of the legend image is returned along with the RGB buffers and the size (in rows/columns) of the legend image itself.

4 Invocation
LOAD_LEGEND_DATA is invoked using the following syntax:

```
short load_legend_data (char legend_path[], byte *legend_buf,
                        byte rbuf[], byte gbuf[], byte bbuf[],
                        unsigned long *legend_x, unsigned long
                        *legend_y)
```

Where

File access status is returned through a short variable.

legend_path: File specification of the directory containing the legend data.
(passed char [])

legend_ptr: Pointer to the beginning of the array containing the legend image data.
(returned byte)

rbuf: Red component of the legend image's palette.
(returned byte [])

gbuf: Blue component of the legend image's palette.
(returned byte [])

bbuf: Green component of the legend image's palette.
(returned byte [])

legend_x: Size of the legend image in the "x" direction (columns).
(returned unsigned long)

legend_y: Size of the legend image in the "y" direction (rows).
(returned unsigned long)

4 Returns
LOAD_LEGEND_DATA returns the following information:

File access status containing one of the following values:

Value	Meaning
1	Normal
-1	Error opening legend header file.

-2 Error reading legend header file.
-3 Error opening legend image file.
-4 Error reading legend image file.
(returned short)

legend_ptr: Pointer to the beginning of the array containing the legend image data.
(returned byte)

rbuf: Red component of the legend image's palette.
(returned byte [])

gbuf: Blue component of the legend image's palette.
(returned byte [])

bbuf: Green component of the legend image's palette.
(returned byte [])

legend_x: Size of the legend image in the "x" direction (columns).
(returned unsigned long)

legend_y: Size of the legend image in the "y" direction (rows).
(returned unsigned long)

3 ODD
Determines whether or not the specified value is odd or even.

4 Invocation
Odd is invoked using the following syntax:

short odd (short num)

Where
A short variable is used to return the status of "num"

num: number to test
(passed short)

4 Returns
ODD returns a short variable that contains one of the following values:

0 if the number tested is odd
1 if the number tested is even

3 POL2EQ
Rotates polar latitude and longitude coordinates to equatorial zone coordinates.

4 Invocation

POL2EQ is invoked using the following syntax:

```
void pol2eq (double *dlatin, double *dlngin, double *dlatout,
             double *dlngout)
```

Where

dlatin: Segments polar latitude coordinate.
(passed double)

dlngin: Segment's polar longitude coordinate.
(passed double)

dlatout: Segment's rotated equatorial latitude coordinate.
(returned double)

dlngout: Segment's rotated equatorial longitude coordinate.
(returned double)

4 Returns

POL2EQ returns the rotated coordinate values through the following arguments:

dlatout: Segment's rotated equatorial latitude coordinate.
(returned double)

dlngout: Segment's rotated equatorial longitude coordinate.
(returned double)

3 RC_CALC

Converts latitude and longitude to row and column values.

4 Invocation

```
void rc_calc (double *rlat, double *rlon, short *scale,
              short *zone, long *row, long *col)
```

Where

rlat: TS segment latitude coordinate
(passed double)

rlon: TS segment longitude coordinate
(passed double)

scale: Map scale
(passed short)

zone: TS zone number that the segment lies within.
(passed short)

row: TS segment row number
(returned long)

col: TS segment column number

(returned long)

4 Returns
RC_CALC returns the segments row and column numbers through the following arguments:

row: TS segment row number based on passed latitude, longitude, scale and zone
(returned long)

col: TS segment column number based on passed latitude, longitude, scale and zone
(returned long)

3 READ_CD_COVRG
Reads the contents of the specified CD_COVRG.DAT file, which contains the approximate coverages for each PA area on the CAC and the PA area's associated zone number.

Originally, zone numbers were not part of the CD_COVRG.DAT file and were added at a later date (beginning with CAC CD-1991-A-MAP3-1005). Hence, earlier versions of the CD_COVRG.DAT file do not contain zone numbers. The structure "no_zone_cacs", containing the PA area/zone number association for those CAC's, is used for accessing these "older" files. The CD_ID.DAT file MUST be read first in order to correctly process the CD_COVRG.DAT file (see CAC_INIT for information about file access).

4 Invocation
READ_CD_COVRG is invoked using the following syntax:

```
short read_cd_covrg (char path[],
                     char pa_nums[MAX_PAS][8],
                     short *num_pas,
                     double pa_latlon[MAX_PAS][4],
                     char pa_zones[MAX_PAS])
```

Where
File access status is returned through a short variable.

path: Complete path specification to the CD-ROM's CD_COVRG.DAT file.
(passed char [])

pa_nums: Two-dimensional array of palette area names from the CD_COVRG.DAT file. Each palette area name is 8 bytes. The maximum number of possible palette areas on one CD-ROM is MAX_PAS (see CAC.H).
(returned char[][])

num_pas: The number of palette areas on the CD-ROM.
(returned short)

pa_latlon: Two-dimensional array of approximate coverages of each palette area on the CD-ROM. The order of the lat/lon data in the array is:

[*][0] - West longitude
[*][1] - East longitude
[*][2] - South latitude
[*][3] - North latitude

(returned double[][])

pa_zones: Array of TS zone numbers corresponding to the "pa_nums" above.
(returned char[][])

4 Returns

READ_CD_COVRG returns the following information:

File access status containing one of the following values:

Value	Meaning
1	Normal
-1	Error opening CD_COVRG.DAT file.
-2	Error reading the number of palette areas from CD_COVRG.DAT file.
-3	Error reading a palette area name from CD_COVRG.DAT file.
-4	Error reading a palette area lat/lon set from CD_COVRG.DAT file.

(returned short)

pa_nums: Two-dimensional array of palette area names from the CD_COVRG.DAT file. Each palette area name is 8 bytes. The maximum number of possible palette areas on one CD-ROM is MAX_PAS (see CAC.H).
(returned char[][])

num_pas: The number of palette areas on the CD-ROM.
(returned short)

pa_latlon: Two-dimensional array of approximate coverages of each palette area on the CD-ROM. The order of the latitude/longitude data in the array is:

[*][0] - West longitude
[*][1] - East longitude
[*][2] - South latitude
[*][3] - North latitude

(returned double[][])

pa_zones: Array of TS zone numbers corresponding to the "pa_nums" above.
(returned char[][])

3 READ_CD_ID

Reads the CD_ID.DAT file from the [ID] directory on the CD-ROM.

4 Invocation
READ_CD_ID is invoked using the following syntax.

```
short read_cd_id (char path[], char data[])
```

Where
Completion status is returned through a short variable.

path: Complete path specification to the CD-ROM's CD_ID.DAT file.
(passed char [])

data: Contents of specified CD_ID.DAT file.
(returned char [], requires twenty bytes)

4 Returns
READ_CD_ID returns the following information:

File access status containing one of the following values:

Value	Meaning
1	Normal
-1	Error opening CD_ID.DAT file.
-2	Error reading CD_ID.DAT file.

(returned short)

data: Contents of specified CD_ID.DAT file.
(returned char [], requires twenty bytes)

3 READ_COMPRESSED_SEGMENT
Reads the compressed segment and its codebook. The codebook and segment are buffered into the array "segbuf". This is an array of structures of type "ASegment". The number of segments that can be buffered is controlled by the definition of MAX_SEGS_IN_BUF (in CAC.H). This buffering reduces the overhead of having to re-read an often used segment.

4 Invocation
READ_COMPRESSED_SEGMENT is invoked using the following syntax:

```
short read_compressed_segment (char pa_path[],
                               byte *codebook,
                               byte *compseg)
```

where
File access status is returned through a short variable.

pa_path: Complete file specification of CAC segment file of interest.
(passed char [])

codebook: Contains compression codebook data.
(returned byte)

compseg: Contains compressed segment data.
(returned byte)

4 Returns:
READ_COMPRESSED_SEGMENT returns the following information:

File access status containing one of the following values:

Value	Meaning
1	Normal
-1	Error opening compressed CAC segment file.
-2	Error reading compressed CAC segment codebook.
-3	Error reading compressed CAC segment data.

(returned short)

codebook: Contains compression codebook data.
(returned byte)

compseg: Contains compressed segment data.
(returned byte)

3 READ_PA_COVERAGE
Reads the scaled integer lat/long coordinate from a COVERAGE.DAT file and returns them as doubles. Note that the scaled integers are stored with their bytes swapped and must be re-swapped before conversion to real numbers.

4 Invocation
READ_PA_COVERAGE is invoked using the following syntax:

```
short read_pa_coverage (pa_coverage_file, left_lon, right_lon,
                        bot_lat, top_lat)
```

Where
PA_COVERAGE_FILE: Path name specification of COVERAGE.DAT file.
DEVICE:[ODIXXXXX.MAPX.PAXXXXYY]COVERAGE.DAT
(passed char)

left_lon: Left longitude coordinate
(returned double)

right_lon: Right longitude coordinate
(returned double)

bot_lat: Bottom latitude coordinate
(returned double)

top_lat: Top latitude coordinate
(returned double)

4 Returns
READ_PA_COVERAGE returns the following information.

File access status is returned through a short variable containing one of the following values:

Value	Meaning
1	Normal
-1	Error opening PA COVERAGE.DAT file.
-2	Error reading PA COVERAGE.DAT file.

(returned short)

right_lon: Right longitude coordinate
(returned double)

bot_lat: Bottom latitude coordinate
(returned double)

top_lat: Top latitude coordinate
(returned double)

3 READ_PALETTE

Reads the specified CAC day, night, or mono color palette.

4 Invocation

READ_PALETTE is invoked using the following syntax:

```
short read_palette (char type, char path[], byte red[],
                    byte green[], byte blue[])
```

Where

file access status is returned through a short variable

type: Day or night palette differentiation
(passed char)

path: Complete file specification of the CAC color palette file
(passed char)

red: Red component of color palette
(returned byte)

green: Green component of color palette
(returned byte)

blue: Blue component of color palette
(returned byte)

4 Returns

READ_PALETTE returns the following information:

File access status containing one of the following values.

Value	Meaning
1	Normal

```
            -1    Error opening CAC color palette
            -2    Error reading CAC color palette
            (returned short)

       red: Red component of color palette
            (returned byte)

     green: Green component of color palette
            (returned byte)

      blue: Blue component of color palette
            (returned byte)

3 SI_CONVERT
  Converts an ASCII string in the form sDDDMMSS.SS to a scaled
  integer.  Where

      "s" is the sign of the latitude or longitude
      (i.e., "+" or "-").  The "s" must always be present.

      DDD is degrees
       MM is minutes
    SS.SS is seconds

4 Invocation
 SI_CONVERT is invoked using the following syntax:

    long si_convert (*value,type)

  Where:
        The scaled integer of the "value" is returned through a
        long variable.

        value: ASCII value of coordinates
               (passed char)

         type: Latitude or longitude type of conversion
               (passed short)

3 SI_TO_DOUBLE
 Converts a scaled integer to a real number (double).  Returns
 the value as a double.

4 Invocation

 SI_TO_DOUBLE is invoked using the following syntax:

     double si_to_double (si)

  Where:
        The real number of "si" is returned through a double
        variable.
```

si: Scaled integer
(passed long)

3 SPDEC
Decompresses a CAC compressed segment.

4 Invocation

Due to the memory constraints of MS-DOS, this routine has two syntaxes: One for MS-DOS and one for VMS and UNIX.

The VMS and UNIX syntax follows:

```
void spdec (unsigned char inptr[16384],
            unsigned char spcbptr[16384],
            unsigned char outptr[16384])
```

Where

inptr: Compressed segment to be decompressed. The compressed segment is assumed to be 16382 bytes. (passed byte)

spcbptr: Codebook to be used to decompress the segment. The codebook is assumed to be 1024 bytes. (passed byte)

outptr: Decompressed segment. The decompressed segment requires 65536 bytes. (returned byte)

2 CCOMMA.C
Places commas in an integer number. This function should only be invoked by routines written in C code. For the equivalent FORTRAN language function, see subtopic FCCOMMA.C

CCOMMA.C is invoked using the following syntax:

```
long ccomma (number)
```

where

The function returns the address of a character string that contains the number (passed) with commas.

number Contains an integer number (passed)

3 Example
The following pseudocode provides an example of usage.

```
long  number=100100999          /* integer to be passed */
```

```
   fprint ("%s /n") ccomma(number)     /* invocation */

   /* The string "100,100,999" is printed */
```

2 CHECK_LON_ORIENTATION.C

A C language routine that determines whether a minimum longitude value and maximum longitude value are the true minimum and maximum values for a given data set.

3 Input_Output

In addition to minimum and maximum longitude values, CHECK_LON_ORIENTATION must be passed one of the following integer values:

0 - When the data set crosses 0 degrees longitude.

180 - When the data set crosses 180 degrees longitude.

CHECK_LON_ORIENTATION returns the following values:

1 (for TRUE) if the minimum longitude is LESS than the maximum longitude.

0 (or FALSE) if the minimum longitude is GREATER than the maximum longitude (when passed 0),

OR

if the minimum longitude is indeed GREATER than or EQUAL to the maximum longitude (when passed 180).

3 Invocation

CHECK_LON_ORIENTATION is invoked using the following syntax:

```
   long CHECK_LON_ORIENTATION (long *status, float *minlon,
                               float *maxlon);
```

Where

The orientation status is returned through a long (integer) variable.

status: Whether the data set crosses 0 or 180
(passed long)
minlon: Minimum longitude
(passed long)
maxlon: Maximum longitude
(passed long)

Pseudocode examples of invocation from FORTRAN and C programs are provided.

4 FORTRAN_Example

FORTRAN pseudocode example:

```
integer*4     status = 180      ! Data set crosses 180 degrees
real*4        minlon = -50.0    ! Minimum longitude
real*4        maxlon =  60.0    ! Maximum longitude

if ((check_lon_orientation(status, minlon, maxlon)).ne.1) then
     temp   = minlon
     minlon = maxlon    ! minimum and maximum longitude values
     maxlon = temp      ! are not in the correct orientation
endif                   ! so they are swapped.
```

4 C_Example

C pseudocode example:

```
long check_lon_orientation (long *status, float *minlon,
                            float *maxlon);

status = 0;          /*  long, data set crosses 0 degrees */
minlon =  50.0;      /*  float, minimum longitude         */
maxlon = -60.0;      /*  float, maximum longitude         */

if (!(check_lon_orientation(&status, &minlon, &maxlon))
{
   temp = minlon;
   minlon = maxlon;  /* minimum and maximum longitude values*/
   maxlon = temp;    /* are not in the correct orientation  */
 }                   /* so they are swapped.                */
```

2 CLEAN_UP.C

Subroutine CLEAN_UP.C traverses the current processing thread directory structure and performs functions necessary for trimming the chart ODI.

3 Functionality

CLEANUP.C performs the following functions that are necessary for trimming the chart ODI.

* Creates a log file in the MDFF_SCRATCH directory, named CLEANUP.LOG, which contains the following information:
  - Error messages generated during execution
  - Information about ID directories
  - Zone coverages
  - MAP directory summary.

* Purges the ID and MAP directories.

* Renames all files to have a file version of one (;1).

* Inserts copies of the ID files into CLEANUP.LOG.

* Checks for extra directories and reports the total number of directories.

* Deletes all DR_COVRG.DAT files.

* Attempts to perform open, read, scan, and seek operations on HEADER.DAT files. Reports the total number of HEADER.DAT files and error messages.

* Counts PA directories and insures that there is only one PA directory per zone.

* Verifies and reports the number of ROW directories.

* Counts CD directories and insures that the number of CD directories matches the number of CD-ROMS processed listed in the CHART STATUS file.

* Verifies and reports the number of LEGEND files.

* Verifies and reports the number SOURCE GRAPHICS files.

* Verifies and reports the number of PALETTE.DAT files and insures that each PA directory has a PALETTE.DAT file.

* Verifies and reports the number of COVERAGE.DAT files and insures that each PA directory has a COVERAGE.DAT file.

* Verifies and reports the number of SEGMENT files.

* For each zone, verifies that all segments fall within defined boundaries. Reports boundaries and any errors encountered.

* Checks for extraneous files.

3 Invocation

Use the following syntax to invoke CLEAN_UP.C:

```
errors = CLEAN_UP ();
```

where errors is an INTEGER*4 (LONG) variable containing the number of errors found during execution. Detected errors may be corrected and CLEAN_UP re-invoked.

** CLEANUP should be invoked until an error count of zero is returned.

2 COORDINATES.FOR

Contains routines that convert latitude/longitude coordinates into

their degrees, minutes, and seconds equivalents. Each routine is described as a subtopic.

3 DISPLAY_COORD
Double precision floating point latitude/longitude coordinate pairs are converted to their degrees, minutes and seconds equivalents and displayed on the user's terminal.

The following syntax is used to invoke DISPLAY_COORD:

```
call DISPLAY_COORD( SOUTHLAT, WESTLONG, NORTHLAT, EASTLONG)
```

where

SOUTHLAT	Southern latitude coordinate (passed, real*8)
NORTHLAT	Northern latitude coordinate (passed, real*8)
WESTLONG	Western longitude coordinate (passed, real*8)
EASTLONG	Eastern longitude coordinate (passed, real*8)

4 Example
The following FORTRAN-based pseudocode provides an example of usage:

```
C *** Using these coordinate values as input
      SOUTHLAT  = -25.25
      WESTLONG  = -125.75

      NORTHLAT  =  30.00
      EASTLONG  = -90.00

     CALL DISPLAY_COORD( SOUTHLAT, WESTLONG, NORTHLAT, EASTLONG)

C *** The following equivalent values are displayed:

 southlat:  -25.25 degrees =  -25 deg 15 min 00.00 sec
 westlong: -125.75 degrees = -125 deg 45 min 00.00 sec

 northlat:   30.00 degrees =   30 deg 00 min 00.00 sec
 eastlong:  -90.00 degrees =  -90 deg 00 min 00.00 sec
```

3 ENTER_COORD
Issues prompts for a pair of latitude/longitude coordinates. Because they are stored as a character string, the coordinates may be entered as either integer, decimal, or degrees, minutes and seconds values (i.e., 90, 90.25, or 90 15 00). When the coordinates are entered as integer or degrees, minutes, and

seconds, the character string is converted to a double precision floating point value by the function DECIMAL (see subtopic DECIMAL.FOR for additional information). When the coordinates are entered as decimal values, the character string is converted to its double precision floating point value by an internal READ statement.

The following syntax is used to invoke ENTER_COORD:

```
call ENTER_COORD(NEW_LAT, NEW_LON)
```

where

NEW_LAT	Contains the converted latitude coordinate (returned, real*8)
NEW_LON	Contains the converted longitude coordinate (returned, real*8)

2 CREATE_PA_DIR.C

---------- TO BE ADDED LATER ----------

2 DECIMAL.FOR

This function is designed to accept a character string from the routine ENTER_COORD.FOR and convert it to its double precision equivalent. The character string must contain a coordinate value in either decimal or degrees, minutes and seconds formats. Both formats are converted to a double precision floating point value.

The following syntax is used to invoke DECIMAL:

```
REAL*8 FUNCTION DECIMAL (ATMP)
```

where

REAL*8	Returns the converted decimal value
ATMP	Contains the coordinated to be converted (passed, character*80)

3 Examples

The following FORTRAN-based pseudocode provides examples of usage:

```
C *** Using the following input string

     ATMP = '90 15 00'
     LAT = DECIMAL (ATMP)

C *** The returned value of LAT is 90.2500

C *** Using the following input string
     ATMP = '90'
```

```
      LAT = DECIMAL( ATMP)

 C*** The returned value of LAT is 90.0000
```

2 DTR_PROCS.FOR
Contains a suite of FORTRAN language routines for converting to and from Datatrieve data storage format. Routines exist for converting to/from Datatrieve CHARACTER format to REAL*4 format. Subtopics provide descriptions of routines within the suite.

3 CLOSE_ADRG_DTR_FILE
Closes an open (Datatrieve ADRG) file that has been designated as unit 10. CLOSE_ADRG_DTR_FILE is invoked using the following syntax:

```
       call CLOSE_ADRG_DTR_FILE
```

3 DECODE_DTR_LATLON
Converts two longitude and two latitude values, from the Datatrieve "integer" format (which is actually in a character format), into REAL*4 format. DECODE_DTR_LATLON is invoked using the following syntax:

```
  call DECODE_DTR_LATLON (encoded,tlat,blat,llon,rlon)
```

where

STRUCTURE	encoded		
	(Passes the following fields)		
	CHARACTER*12	serial	Chart serial number
	CHARACTER*2	edition	Chart edition number
	CHARACTER*4	llat	Chart minimum latitude
	CHARACTER*4	ulat	Chart maximum latitude
	CHARACTER*5	llon	Chart minimum longitude
	CHARACTER*5	rlon	Chart maximum longitude
	CHARACTER*29	geo_loc	Chart geographic location
	CHARACTER*6	cdnum	ADRG CD serial number
	CHARACTER*7	date	Date entered into database
	CHARACTER*2	box	Backup box storing the ADRG CD
	CHARACTER*1	cac	CAC inclusion flag
	CHARACTER*1	dist	Distribution statement flag
	CHARACTER*1	sheet	Flag for paper chart that is stored in the MDFF lab

REAL*4	blat	Minimum latitude of chart (returned)
REAL*4	tlat	Maximum latitude of chart (returned)
REAL*4	llon	Minimum longitude of chart (returned)
REAL*4	rlon	Maximum longitude of chart

(returned)

3 ENCODE_DTR_LATLON

Converts two longitude and two latitude values from REAL*4 format, into the Datatrieve "integer" format (which is actually in character format). ENCODE_DTR_LATLON is invoked using the following syntax:

```
call ENCODE_DTR_LATLON (tlat,blat,llon,rlon,encoded)
```

where

REAL*4	blat	Minimum latitude of chart (passed)
REAL*4	tlat	Maximum latitude of chart (passed)
REAL*4	llon	Minimum longitude of chart (passed)
REAL*4	rlon	Maximum longitude of chart (passed)

STRUCTURE encoded (returns the following fields)

CHARACTER*12	serial	Chart serial number
CHARACTER*2	edition	Chart edition number
CHARACTER*4	llat	Chart minimum latitude
CHARACTER*4	ulat	Chart maximum latitude
CHARACTER*5	llon	Chart minimum longitude
CHARACTER*5	rlon	Chart maximum longitude
CHARACTER*29	geo_loc	Chart geographic location
CHARACTER*6	cdnum	ADRG cd serial number
CHARACTER*7	date	Date entered into database
CHARACTER*2	box	Backup box storing the ADRG CD
CHARACTER*1	cac	CAC inclusion flag
CHARACTER*1	dist	Distribution statement flag
CHARACTER*1	sheet	Flag for paper chart that is stored in the MDFF lab

3 MODIFY_DTR_CHARTS_CACED

Reads charts in current CHART_STATUS file and changes the CAC coverage field in the appropriate ADRG database file from a blank to a 'C', which indicates which chart has been incorporated into a CAC. MODIFY_DTR_CHARTS_CACED is invoked using the following syntax:

```
Call MODIFY_DTR_CHARTS_CACED()
```

3 OPEN_ADRG_DTR_FILE

Performs a formatted open (as unit 10) on a Datatrieve ADRG file. The ADRG file opened is based on the map scale. OPEN_ADRG_DTR_FILE is invoked using the following syntax:

```
        call OPEN_ADRG_DTR_FILE (map_scale)

 where
     INTEGER*2  map_scale        ADRG map scale, ranges from 0 to 7
                                  (passed)


3 READ_ADRG_DTR_RECORD
 Returns a status indicating the existence of a record.  If the
 record exists, all fields, contained within the ADRG database are
 returned.  READ_ADRG_DTR_RECORD is invoked using the following
 syntax:

        status =  READ_ADRG_DTR_RECORD(decoded)

 where
   LOGICAL    status
              (returned)

 STRUCTURE    decoded
              (returns the following fields)
      CHARACTER*12    serial      Chart serial number
       CHARACTER*2    edition     Chart edition number
            REAL*4    llat        Chart minimum latitude
            REAL*4     ulat       Chart maximum latitude
            REAL*4     llon       Chart minimum longitude
            REAL*4     rlon       Chart max longitude
      CHARACTER*29     geo_loc    Chart geographic location
       CHARACTER*6     cdnum      ADRG CD serial number
       CHARACTER*7     date       Date entered into database
       CHARACTER*2     box        Backup box storing the ADRG CD
       CHARACTER*1     cac        CAC inclusion flag
       CHARACTER*1     dist       Distribution statement flag
       CHARACTER*1     sheet      Flag for paper chart that is
                                  stored in the MDFF lab


2 FCOMMA.C
 Places commas in an integer number.  This function should only be
 invoked by routines written in FORTRAN code.  For the equivalent
 C language function, see subtopic CCOMMA.C.

 FCOMMA.C is invoked using the following syntax:

   character*(*) function FCOMMA (number)

 where
          A character string, containing the number with newly
          inserted commas, is returned.

          number      Contains an integer number
                      (passed)
```

```
3 Example
 The following pseudocode provides an example of usage.

       integer*4    number/100100999/       ! integer to be passed

       write (6, '(1x,a)') FCOMMA (number)  ! invocation

       ! The string "100,100,999" is printed.


2 FILE_ATTR_PROCS.C
 Contains a suite of C language routines that provide information
 about VMS files and directories.  Subtopics include requirements
 and individual routines within the suite.

3 Include_files
 The file, "V2_DIR:F_FILE_ATTR.H", contains data definitions that
 are used by suite routines and must be included in the source
code.

 The following external routine is required for linkage:

 F_FILE_ATTR.MAR   Implementation of the DCL lexical function
                   F$FILE_ATTRIBUTE as a "callable" subroutine

3 Suite_Description
 FILE_ATTR_PROCS.C contains the following routines:

4 FILE_SIZE_INIT
 Initializes the variables that are used by file_size_send and
 file_size_ret.  The following syntax is used to invoke
 file_size_init:

     void file_size_init ()

4 FILE_SIZE_SEND
 Determines whether the file, which is passed as an argument, is a
 directory or a file.  Calls a macro subroutine that reads the file
 until end-of-file is encountered and determines the number of
 actual blocks that the file, or directory uses.  The following
 syntax is used to invoke file_size_send:

   long file_size_send (struct dsc$descriptor_s *fname)

  where
     long     Return status that will possess one of the following
              values:   TRUE  if no errors are encountered
                        FALSE if errors are encountered

     fname    Name of directory or file.  Passed as
              struct dsc$descriptor_s
```

4 FILE_SIZE_RET
Returns the total number of blocks that are used by files and directories which have been passed as arguments to the file_size_send routine. The following syntax is used to invoke file_size_ret:

```
void file_size_ret (long *f_blocks_used, long *d_blocks_used)
```

where

f_blocks_used The total number of blocks used by the files. (passed long)

d_blocks_used The total number of blocks used by the directories. (passed long)

3 Example
The following C language pseudocode provides an example of usage.

```
call FILE_SIZE_INIT ()  ! This sets up the variables used by the
                        ! next two calls.  This routine MUST be
                        ! called first.

! Loop through the number of files you wish to obtain total sizes
! on.

 LOOP 1 TO Number_Of_Files

    ! Send in as many files as you like, may only be one.
    ! Filename is a string descriptor.

    call FILE_SIZE_SEND (filename)

 END LOOP

! This is the final routine and MUST be called last.  It returns
! the total blocks used by files and directories, passed into
! FILE_SIZE_SEND.  Arguments are passed by reference

call FILE_SIZE_RET (f_blocks_used, d_blocks_used)
```

2 FIND_CAC_BITMAP.C
Returns all CAC logged bitmap file names that are stored in the MDFF_SYSTEM:[BITMAPS] directory for a given scale and zone.

FIND_CAC_BITMAP.C contains two routines, each is described as a subtopic. In order for the process to work correctly, the routines must be called in proper sequence.

3 Include_Files

The following file must be included for use with FIND_CAC_BITMAP.C:

V2_DIR:DATA_DEFS.H	Contains type definitions for common variables (e.g., scale, zone)

3 FIND_CAC_BITMAP_INIT

This routine must be used to pass the scale and zone of the CAC bitmaps file names you wish to have returned by the other routine, FIND_CAC_BITMAP_RET.

This routine MUST be invoked first. The following syntax is used to invoke find_cac_bitmap_init:

```
void find_cac_bitmap_init (SCALE *scale, ZONE *zone)
```

where

scale	INTEGER*4	Contains the chart scale (passed, by reference)
zone	INTEGER*4	Contains TS zone (passed by reference)

3 FIND_CAC_BITMAP_RET

Returns CAC a bitmap file name. This routine should be invoked iteratively until filename is returned NULL (i.e., no more files).

All CAC bitmaps will be returned using the scale and zone that were passed earlier to the FIND_CAC_BITMAP_INIT routine.

The following syntax is used to invoke find_cac_bitmap_ret:

```
char *find_cac_bitmap_ret (void)
```

where

char	Contains a CAC bitmap file name (returned)
void	There are no arguments passed

3 Example

The following (FORTRAN-like) code segment provides an example of the correct usage.

```
call FIND_CAC_BITMAP_INIT (scale, zone) ! Use this routine to
                                        ! pass the scale and zone of the
                                        ! CAC bitmaps file names you wish
                                        ! to have returned by the next
                                        ! call.
                                        ! This routine MUST be invoked
                                        ! first.
                                        ! Scale and zone are INTEGER*4
```

```
                                        ! and passed by reference.

! Loop through until filename is NULL (i.e., no more files).  All
! CAC bitmaps will be returned using the scale and zone that were
! passed to the FIND_CAC_BITMAP_INIT function.

LOOP UNTIL filename = NULL
  filename = FIND_CAC_BITMAP_RET ()    ! Filename is a character
                                       ! string pointer and is
                                       ! returned
END LOOP
```

2 FIND_FILE.FOR

Uses search and file names to find a file. This module contains two entry points; one for calling from OpenVMS "C" (FIND_FILE_C) and one for calling from OpenVMS FORTRAN (FIND_FILE).

Two entry points are required, due to the passing of strings by descriptor in VMS FORTRAN. In the "C" version, string arguments are of type "char *" (i.e., pointer to a NULL terminated string). No include files required for invocation.

3 FORTRAN_Invocation

The following syntax is used in FORTRAN invocation:

```
lstatus = FIND_FILE (searchname,reset,filename)
```

where

lstatus is a return value that contains one of the following values:
When the search status is .TRUE. then a match was found.
When the search status is .FALSE., no VMS filename matching the search specification was found.

searchname: VMS filename specification search mask. Wildcards (*) are allowed. (passed, character*(*))

reset: If .TRUE., this resets the search context. This is used to set a new VMS filename specification search string. (passed, logical)

filename: VMS filename specification matching the search mask. (returned, character*(*))

3 C_Invocation

The following syntax is used in C invocation:

```
        lstatus = FIND_FILE_C (searchname,reset,filename)

  where
        lstatus is a return value that contains one of the
        following values:
          When the search status is .TRUE. then a match was found.
          When the search status is .FALSE., no VMS filename
          matching the search specification was found.


         searchname: VMS filename specification search mask.
                     Wildcards (*) are allowed.
                     (passed, char*)

             reset: If .TRUE., this resets the search context.
                    This is used to set a new VMS filename
                    specification search string.
                    (passed, char*)

          filename: VMS filename specification matching the
                    search mask.
                    (returned, char*)

2 GENERIC_QUEUE_STOPPED.FOR

 A FORTRAN function that determines whether a generic queue,
 defined by the currently set processing thread, is stopped.
 A status is returned with one of the following values:

     returns TRUE   when the generic queue is stopped
     returns FALSE  when the generic queue is NOT stopped

3 Invocation
  The following syntax is required for proper invocation.

      lstatus = GENERIC_QUEUE_STOPPED ()

  where

      lstatus is the return status of the generic queue, that
      is declared as a LOGICAL variable.

   returns TRUE   when the generic queue is stopped.
   returns FALSE  when the generic queue is NOT stopped.

3 Example
 The following example uses FORTRAN-based pseudocode to show
 proper use of GENERIC_QUEUE_STOPPED.


 logical    generic_queue_stopped    ! The function declaration
```

```
logical    lstatus                    ! The status returned by
                                      ! generic_queue_stopped

c*********************************************************************
c*  Returns .TRUE. if queue is stopped.                              *
c*  NOTE:  Set the processing thread to be tested before running*
c*********************************************************************

 lstatus = GENERIC_QUEUE_STOPPED ()

c* Print status of Generic Queue *
    if (lstatus .eq. .true.) then
         print*,' '
         print*, 'Generic Queue Stopped...'
       else
         print*,' '
         print*, 'Generic Queue NOT Stopped...'
    endif
```

2 GET_DS_SEGMENT_NAME.FOR

This subroutine builds the complete downsampled segment path name (excluding the color/zone file extension (e.g., ".R_NT").

Two types of root directory paths (i.e., "dspath" argument) for the downsampled data are supported:

Root directory paths terminating in a colon ":"
Root directory paths terminating in a bracket "]"

When the downsampled segment root directory path terminates in a ":" the complete segment path name (i.e., the "segpath" argument) is completed by adding the string:

"[Rsnnnnn]12345678"

When the downsampled segment root directory path terminates in a "]" the complete segment path name (i.e., the "segpath" argument) is completed by removing the "]" and adding the string:

".Rsnnnnn]12345678"

See topic CAC_PROCESSING, subtopic Segment_Files for documentation on downsampled segment file naming conventions.

3 Invocation

Subroutine GET_DS_SEGMENT_NAME should be invoked using the following syntax:

```
call GET_DS_SEGMENT_NAME (dspath,row,col,segpath,seglen)
```

Items contained within the parameter list include:

dspath: Root destination directory for the downsampled data
For example, CHART_SEGMENTS:.
(passed, character*(*))

row: Row number of downsampled segment data.
(passed, integer*4)

column: Column number of downsampled segment data.
(passed, integer*4)

segpath: Complete downsampled segment path name (excluding the color/zone file extension: .R_NT for example).
(returned, character*(*))

seglen: Length of "segpath"
(returned, integer*4)

3 Required_Subroutines

The following subroutines are utilized by GET_DS_SEGMENT_NAME:

ENCODE_KEY: Create the segment key name from the row and column.

STRING_LENGTH: Find the length of a string. Terminates on NULL characters, blank characters and the size of storage allocated for the string.

No "INCLUDE" (i.e., external) files are required.

2 GET_ODI_DATA.C

GET_ODI_DATA contains routines that read mapstation subdirectories, extract row and column values for each of the segments contained within the subdirectories, and store the sorted row/column values in a structure.

GET_ODI_DATA contains the following routines, each of which is described as a subtopic.

GET_ODI_DATA Fills the structure containing row and column values. Returns the number of segments found, the filled structure and a status flag.

QUICKSORT Performs a quicksort, by ascending row, on the passed row/column structure.

GET_HEX_DIGITS Is passed a number (stored in a byte) and uses

masks to obtain the number's hexadecimal equivalent.

3 GET_ODI_DATA

GET_ODI_DATA is passed the row/column structure that will contain row/column values for all segments contained within the specified subdirectories, and the number of subdirectories to be included.

GET_ODI_DATA prompts the user for mapstation subdirectory filenames, which are opened one at a time. The first 4 bytes of subdirectory files are read to obtain information about the subdirectory - mainly the number of keynames that are contained within the subdirectory.

Keynames are extracted and decoded to their row/column values and then placed in the row/column structure.

A count of the number of segments contained within the subdirectory is kept. This count is returned as a long variable.

Once all subdirectory filenames are entered, the operator terminates input by entering 'EXIT'.

The newly filled structure, containing row and column values, is sent to a quicksort where the row and column pairs are sorted in ascending row number.

For all segments contained within the mapstation subdirectories, GET_ODI_DATA returns the newly filled structure containing sorted row and column values, a status flag indicating termination status and the total number of segments found.

4 Invocation

GET_ODI_DATA is invoked using the following syntax.

```
long get_odi_data (struct coord ROW_COL [SEG_MAX], long *flag,
                   *long num_files)
```

where

long	A variable containing the number of segments, within the subdirectories, that were found
struct coord ROW_COL [SEG_MAX]	Array containing the structures for row/column values
long flag	Status return flag. Normal return status = FALSE Abnormal return status = TRUE
long num_files	Passed value represents the number of mapstation sub-directories to be read.

Returned value represents the total number of segment files found.

3 QUICKSORT
Performs a quicksort, by ascending row, on the passed row/column structure.

4 Invocation
QUICKSORT is invoked using the following syntax.

```
void quicksort (struct coord ITEM[], long left, long right)
```

where

struct coord ITEM[]	Array structure containing row/column pairs
long left	A pointer to the structure's first element
long right	A pointer to the structure's last element

3 GET_HEX_DIGITS
When passed a number stored in a byte, GET_HEX_DIGITS uses masks to obtain the hexadecimal equivalent.

For example:
The binary number 01010010 equivalent in hexadecimal is 52.

The 5 (i.e., from the left-most 4 bits) is returned in the variable named LEFT_HEX.

The 2 (i.e., from the right-most 4 bits) is returned in the variable named RIGHT_HEX.

4 Invocation
GET_HEX_DIGITS is invoked using the following syntax.

```
void GET_HEX_DIGITS (unsigned *right_hex, unsigned *left_hex,
                     unsigned number)
```

where

unsigned *right_hex	Right-most digit of hexadecimal equivalent. A return value.
unsigned *left_hex	Left-most digit of hexadecimal equivalent. A return value.
unsigned number	Input value to be converted to hexadecimal

3 Required_Subroutines
The following routine is utilized by GET_ODI_DATA:

DECODE_KEY.FOR A FORTRAN subroutine that decodes a key name into its row and column components. For additional information see CAC_Source_Code subtopic DECODE_KEY.FOR

2 GET_PA_SEGMENT_NAME.FOR

This subroutine builds the complete compressed segment path name (including the zone number in the file extension).

Two types of root directory paths (i.e., "papath" argument) for the compressed data are supported. One root directory path terminates with a colon ":" and the other terminates with a "]".

When the compressed segment path terminates with a ":" the complete segment path name (i.e., "segpath" argument) is completed by adding the string:

"[Rsnnnnn]12345678.90.z"

When the compressed segment path terminates with a "]" the complete segment path name (the "segpath" argument) is completed by removing the "]" and adding the string:

".Rsnnnnn]12345678.90z"

See topic CAC_PROCESSING, subtopic Segment_Files for documentation on compressed segment file naming conventions.

3 Invocation

Subroutine GET_PA_SEGMENT_NAME should be invoked using the following syntax:

call GET_PA_SEGMENT_NAME (papath,row,col,segpath,seglen)

Items contained within the parameter list include:

papath: Root destination directory for the compressed data for example, CHART_ODI_DISK:[MAP5.PA013301].
(passed, character*(*))

row: Row number of compressed segment data.
(passed, integer*4)

column: Column number of compressed segment data.
(passed, integer*4)

segpath: Complete compressed segment path name, including the zone number in the file extension.
(returned, character*(*))

seglen: Length of "segpath"
(returned, integer*4)

3 Required_Subroutines
The following subroutines are utilized by GET_PA_SEGMENT_NAME:

ENCODE_KEY: Create the segment key name from the row and column.

STRING_LENGTH: Find the length of a string. Terminates on NULL characters, blank characters, and the size of storage allocated for the string.

No "INCLUDE" (i.e., external) files are required.

2 GET_PID.FOR
Contains routines that obtain a Process Identification (PID) value. Each routine is described as a subtopic.

3 GET_PID
This routine uses VAX/VMS system services to obtain the calling process's PID. The PID is returned in numeric (hexadecimal) format. The concept of PIDs is unique to VAX/VMS. Hence, this routine may not be applicable to other operating systems. No include files are required for invocation.

The following syntax is used to invoke GET_PID:

```
call GET_PID (pid)
```

where

pid: Current process's Process Identification Code. This is a hexadecimal number. For additional information, see PID in the VAX/VMS documentation.
(returned, integer*4)

3 GETPID_ASC
This routine uses VAX/VMS system services to obtain the calling process's PID. The numeric PID is translated into a character string and returned in text (ASCII) format. PIDs are normally eight characters long. The concept of PIDs is unique to VAX/VMS. Hence, this routine may not be applicable to other operating systems. No include files are required for invocation.

The following syntax is used to invoke GET_ASC:

```
call GETPID_ASC (pid_string)
```

where

pid_string: The calling process's VAX/VMS PID in text format.
(returned, character*(*))

2 GET_UNIX_BINARY_TIME.C

GET_UNIX_BINARY_TIME.C contains a suite of C language functions that are used to convert a VAX time string into the corresponding UNIX binary time.

Functions contained within the suite are described as subtopics.

3 GET_UNIX_BINARY_TIME
When passed a VAX time string, this subroutine calls functions to convert the time string to uppercase, get UNIX binary time as a VAX quadword, and convert that quadword to a longword. The UNIX binary time is returned.

GET_UNIX_BINARY_TIME is invoked using the following syntax:

```
       long GET_UNIX_BINARY_TIME (char *timestr)
where
       long              the return value, UNIX binary time
       char *timestr     the VAX time string, passed as input
```

3 CONVERT_QUAD_TO_LONG
When passed a VAX quadword as two longwords containing a UNIX binary time in nanoseconds, this function returns the UNIX binary time in seconds as a longword.

CONVERT_QUAD_TO_LONG is invoked using the following syntax:

```
      long CONVERT_QUAD_TO_LONG (long one, long two)
where
      long       the return value, UNIX binary time
      long one   first part of the VAX quadword, passed value
      long two   second part of the VAX quadword, passed value
```

3 UPPER_CASE
Converts a character string to uppercase.

UPPER_CASE is invoked using the following syntax:

```
       void UPPER_CASE (char str [], long str_length)
where
        char str  character string being converted to upper case
 long str_length  length of str[]
```

3 Required_Subroutines

TIMEM.MAR, is required for program linkage. See CAC_SOURCE_CODE subtopic TIMEM.MAR for additional information.

2 IIS_PLOT_PROCS.FOR

IIS_PLOT_PROCS contains a suite of FORTRAN subroutines and functions that enable the use of graphic devices and generation of hardcopy plots on the TEKTRONIX printer. The display image is written into a device independent buffer that can be used with any graphics and/or image device (e.g., IVAS, VWS color monitors).

All routine names begin with the string "IIS_" followed by a simple function descriptor. For example, the routine named IIS_LABEL is used for labeling purposes. There are routines for displaying 8-bit and 24-bit data. The 8-bit routines are differentiated from the 24-bit routines by adding "8_BIT" to the routine's name. For example, the routine IIS_LABEL is used for labeling 24-bit images and the routine IIS_LABEL_8BIT is used for labeling 8-bit images.

The subroutines and functions contained within IIS_PLOT_PROCS are described as subtopics. Information concerning proper usage, invocation and parameters is included within the subtopics.

For retrieval purposes within MDFFHELP, routines IIS_BORDER. and IIS_LABEL. are terminated with a period - this is done only to differentiate them from other routines with similar names.

3 IIS_IVAS_INIT

Function IIS_IVAS_INIT contains IVAS commands necessary to allocate the IVAS 600 for stand-alone operation. This function must be invoked by all programs using the IVAS and be one of the first routines invoked.

4 Input_Output

Parameters for IIS_IVAS_INIT include the following:

Input parameters: None

Output parameters: None

Return value: INTEGER*4, channel opened by the FIVASOPEN call. This value is needed to close the channel in order to release the device upon termination of a program.

If the channel is not closed (using FIVASCLOSE(ivaschan)), the device may remain allocated to the user, not allowing others access to the IVAS.

4 Invocation

IIS_IVAS_INIT is invoked using the following syntax:

```
ivaschan = IIS_IVAS_INIT()
```

3 IIS_8BIT_INIT
Function IIS_8BIT_INIT is used to load the 8-bit color definitions into the 8-bit color table. IIS_8BIT_INIT must be invoked before loading the color table. The color definitions are added into the table starting at index 241.

4 Input_Output
Parameters for IIS_8BIT_INIT include the following:

Input parameters:

byte RGBTABLE (256,3) A 256 by 3 array of RGB colors.

Output parameters: None

4 Invocation
IIS_8BIT_INIT is invoked using the following syntax:

```
call IIS_8BIT_INIT (rgbtable)
```

3 IIS_LABEL
Subroutine IIS_LABEL is used to write 24-bit text onto a graphics monitor (i.e., any 24-bit color monitor, such as the IVAS color monitor). Text is written using the red, green, and blue buffers in the user's program. Text appears on the monitor and on any hard copies that are produced on the TEKTRONIX printer.

Because IIS_LABEL loads the image buffer with desired text, IIS_LABEL must be invoked prior to loading the buffer onto the IVAS color monitor (via appropriate subroutine). Similarly, IIS_LABEL must be invoked prior to creating a TEKTRONIX print file (via subroutine CREATE_IVAS_PRINTEK_IMAGES).

4 Character_Set
Printable characters are listed below.

Upper and lower case characters:

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
```

Numbers:

```
0123456789
```

Other characters:

```
+ - = ( ) * &  % $ # @ , . ¦ \ / ? < > ! ' " [ ]
```

4 Input_Output
The following parameters are required as input:

character*(*)TLABEL A string of currently defined characters, of a length assigned in the calling routine, to write into the image.

integer*4 XOFF Number of pixels from the left side of image to place the start of "TLABEL".

integer*4 YOFF Number of pixels from the top of image to place the start of "TLABEL".

XOFF and YOFF refer to the placement of the lower left corner of the first character of "TLABLE"

character*1 TDIRECT Defines whether the string "TLABEL" is to be written horizontally (input value 'H') or vertically (input value 'V').

integer*2 ULINE Underline option. If "ULINE" is 0, then the label "TLABEL" is not underlined. A value of 1 will place a single line under "TLABEL" with a single pixel gap between the characters and the line. With a value of 2, two lines are placed under the characters with no gap between the line and the characters.

logical ON_BLACK If true, then the characters are written into the image on a black background, overwriting image data. If false, then characters are written with the image data as background (i.e., image data is not blacked out).

integer*2 RGB Used for defining text color. This value is a hexadecimal value with the following values:

'rgb'x: where rgb refers to the red, green, and blue guns of the IVAS. A value of 0 for r, g, or b indicates the gun is "off," a value of 1 indicates the gun is "on."

'rgb' values	resultant colors
'000'x	BLACK (not recommended)
'100'x	RED
'010'x	GREEN
'001'x	BLUE
'110'x	YELLOW
'011'x	CYAN
'101'x	MAGENTA
'111'x	WHITE

byte RBUF(XDIM,YDIM)		Two-dimensional byte buffer containing the red component of the image.
byte GBUF(XDIM,YDIM)		Two-dimensional byte buffer containing the green component of the image.
byte BBUF(XDIM,YDIM)		Two-dimensional byte buffer containing the blue component of the image.
integer*4	XDIM	First dimension of RBUF, GBUF and BBUF byte array; represents the number of pixel columns in the image.
integer*4	YDIM	Second dimension of RBUF, GBUF and BBUF byte arrays; represents the number of pixel rows in the image.

Output parameters: None

4 Invocation

IIS_LABEL is invoked using the following syntax

```
   call IIS_LABEL (tlabel, xoff, yoff, tdirect, uline, rgb,
*                  rbuf, gbuf, bbuf, xdim, ydim)
```

3 IIS_LABEL_8BIT

Subroutine IIS_LABEL_8BIT is used to write 8-bit text onto a graphics monitor (i.e., any 8-bit color monitor). Text is written using one buffer.

For printing on the TEKTRONIX printer, the single 8-bit buffer is converted into 8-bit red, green, and blue buffers (resulting with a 24-bit image). Since the 8-bit value of the characters are used as an index into the color table, the conversion to 24-bit still yields the identical color defined (i.e., the 8-bit red value is converted to its 24-bit equivalent).

Because IIS_LABEL_8BIT loads the image buffer with desired text, IIS_LABEL_8BIT must be invoked prior to loading the buffer onto the IVAS color monitor (via appropriate subroutine). Similarly, IIS_LABEL_8BIT must be invoked prior to creating a TEKTRONIX print file via subroutine CREATE_IVAS_PRINTEK_IMAGES.

4 Character_Set

Printable characters are listed below.

Upper and lower case characters:

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
```

Numbers:

0123456789

Other characters:

+ - = ( ) * & % $ # @ , . ¦ \ / ? < > ! ' " [ ]

4 Input_Parameters

The following parameters are required as input:

character*(*)	TLABEL	A string of currently defined characters, of a length assigned in the calling routine, to write into the image.
integer*4	XOFF	Number of pixels from the left side of image to place the start of "TLABEL".
integer*4	YOFF	Number of pixels from the top of image to place the start of "TLABEL".

XOFF and YOFF refer to the placement of the lower left corner of the first character of "TLABLE".

character*1	TDIRECT	Defines whether the string "TLABEL" is to be written horizontally (input value 'H') or vertically (input value 'V').
integer*2	ULINE	Underline option. If "ULINE" is 0, then the label "TLABEL" is not underlined. A value of 1 will place a single line under "TLABEL" with a single pixel gap between the characters and the line. With a value of 2, two lines are placed under the characters with no gap between the line and the characters.
logical	ON_BLACK	If true, then the characters are written into the image on a black background, overwriting image data. If false, then characters are written with the image data as background (i.e., image data is not blacked out).
integer*2	RGB	Used for defining text color. This value is a hexadecimal value with the following values:

'rgb'x: where rgb refers to the red, green, and blue guns of the graphics device. A value of 0 for r, g, or b indicates the gun is "off",

a value of 1 indicates the gun is "on".

'rgb' values	resultant colors
'000'x	BLACK (not recommended)
'100'x	RED
'010'x	GREEN
'001'x	BLUE
'110'x	YELLOW
'011'x	CYAN
'101'x	MAGENTA
'111'x	WHITE

byte RGBBUF(XDIM,YDIM) Two-dimensional byte buffer containing the red, green, and blue components of the image.

integer*4 XDIM First dimension of RGBBUF byte array; represents the number of pixel columns in the image.

integer*4 YDIM Second dimension of RGBBUF byte array; represents the number of pixel rows in the image.

Output parameters: None

4 Invocation
IIS_LABEL_8BIT is invoked using the following syntax:

```
call IIS_LABEL_8BIT (tlabel, xoff, yoff, tdirect, uline, rgb,
*                    rgbbuf, xdim, ydim)
```

3 IIS_BORDER
Subroutine IIS_BORDER places a border around a 24-bit image.

4 Input_Output
The following parameters are required as input:

integer*2 RGB Used for defining border color. This value is a hexadecimal value with the following values:

'rgb'x: where rgb refers to the red, green, and blue guns of the graphics device. A value of 0 for r, g, or b indicates the gun is "off", a value of 1 indicates the gun is "on".

'rgb' values	resultant colors

'000'x	BLACK (not recommended)
'100'x	RED
'010'x	GREEN
'001'x	BLUE
'110'x	YELLOW
'011'x	CYAN
'101'x	MAGENTA
'111'x	WHITE

integer*2 THICKNESS — Indicates the number of lines used in drawing border. An increasing number of lines increases the border thickness. Allowed values: 1, 2, 3. A value less than 1 is set to 1 and a value greater than 3 is set to 3.

byte RBUF — A two-dimensional byte buffer containing the red component of the image.

byte GBUF — A two-dimensional byte buffer containing the green component of the image.

byte BBUF — A two-dimensional byte buffer containing the blue component of the image.

integer*4 XDIM — First dimension of RBUF, GBUF, and BBUF byte arrays; represents the number of pixel columns in the image.

integer*4 YDIM — Second dimension of RBUF, GBUF, and BBUF byte arrays; represents the number of pixel rows in the image.

Output parameters: None

4 Invocation

IIS_BORDER is invoked using the following syntax:

```
call IIS_BORDER (rgb, thickness, rbuf, gbuf, bbuf, xdim, ydim)
```

3 IIS_BORDER_8BIT

Subroutine IIS_BORDER_8BIT is used to place a border around an 8-bit image for display on a graphics device or on TEKTRONIX hard copies.

4 Input_Output

The following parameters are required as input:

integer*2 RGB — Used for defining border color. This value

is a hexadecimal value with the following values:

'rgb'x: where rgb refers to the red, green, and blue guns of the graphics device. A value of 0 for r, g, or b indicates the gun is "off", a value of 1 indicates the gun is "on".

'rgb' values	resultant colors
'000'x	BLACK (not recommended)
'100'x	RED
'010'x	GREEN
'001'x	BLUE
'110'x	YELLOW
'011'x	CYAN
'101'x	MAGENTA
'111'x	WHITE

integer*2 THICKNESS — Indicates the number of lines used in drawing border. An increasing number of lines increases the border thickness. Allowed values: 1, 2, 3. A value less than 1 is set to 1 and a value greater than 3 is set to 3.

byte RGBBUF — Two-dimensional byte buffer containing the red, green, and blue components of the image.

integer*4 XDIM — First dimension of RGBBUF byte array; represents the number of pixel columns in the image.

integer*4 YDIM — Second dimension of RGBBUF byte array; represents the number of pixel rows in the image.

Output parameters: None

4 Invocation

IIS_BORDER_8BIT is invoked using the following syntax:

```
call IIS_BORDER_8BIT (rgb, thickness, rgbbuf, xdim, ydim)
```

3 IIS_PLOT_DRIVER

Program IIS_PLOT_DRIVER is a program that displays the currently defined character set onto the IVAS monitor and produces a hard copy on the TEKTRONIX plotter. The character set is displayed several times, once in each of the definable colors. The user has

the option of using an 8-bit or 24-bit display (i.e., invocation of subroutines IIS_LABEL or IIS_LABEL_8BIT).

A hard copy can be produced by entering a file name at the prompt. Entering a <CTRL_Z> at the prompt will terminate program execution without producing a hard copy.

IIS_PLOT_DRIVER can be executed from any node. However, only node "AVENGR" is capable of both display on the IVAS color monitor and generating a hard copy on the TEKTRONIX plotter. All other nodes may only generate hard copies on the TEKTRONIX plotter.

3 IIS_PLOT_PROCS.INC

Common to each routine within IIS_PLOT_PROCS suite is the INCLUDE file IIS_PLOT_PROCS.INC. This file contains the character set definitions.

IIS_PLOT_PROCS.INC is not necessary unless access to variables names, which are used to display the defined character set, is required. Hence, the program IIS_PLOT_DRIVER uses this file (and for no other reason).

Variable names containing the defined character set can be found in either IIS_PLOT_DRIVER.FOR source code or IIS_PLOT_PROCS.INC source code.

2 LL_MAXMIN.C

LL_MAXMIN.C contains routines that determine the true pair of minimum and maximum coordinates from a set of coordinate pairs. These coordinate pairs can be expressed as row/column values or latitude/longitude values. Also, LL_MAXMIN determines whether the set of coordinate pairs transition 180 or 0 degrees longitude and adjusts the minimum and maximum coordinates accordingly.

3 Routines

LL_MAXMIN consists of four routines, only three will be used at any given time. Each routine is described below.

LL_MAXMIN_INIT: Initializes the variables used by the other subroutines. This routine MUST be called first.

LL_MAXMIN_SEND_RC: Repeat for each row/column pair within the set. This is invoked if the calling routine has row/column values available. If this routine is called, LL_MAXMIN_SEND is not used.

LL_MAXMIN_SEND: Repeat for each latitude/longitude pair within

the set. This is called if the calling routine has latitude/longitude values available. If this routine is called, LL_MAXMIN_SEND_RC is not used.

LL_MAXMIN_RET: The final subroutine, must be called last. Returns the minimum and maximum coordinates (in terms of LATITUDE and LONGITUDE) from all of the pairs passed to LL_MAXMIN_SEND.

In order to work correctly, the three selected subroutines MUST be invoked in proper sequence. The Example subtopic shows proper usage.

3 Example

The following example uses pseudocode to show proper use of LL_MAXMIN and its associated subroutines.

```
call LL_MAXMIN_INIT (scale, zone) ! Initialize the variables used
                                  ! by the next two calls.  Scale
                                  ! and zone are INTEGER*4
                                  ! (or longs) and are passed
                                  ! by reference.  This routine
                                  ! MUST be called first.

! Loop - repeat for each latitude/longitude or row/col pair within

! the set.
! If the calling program has row/col values, use LL_MAXMIN_SEND_RC

! If the program has latitude/longitude values, use
  LL_MAXMIN_SEND

     LOOP 1 to Number_Of_Coordinate_Pairs

        ! Send as many latitude/longitude pairs as desired.
        ! Latitude and Longitude are REAL*8 (or DOUBLE) and
        ! are passed by reference.

              call LL_MAXMIN_SEND (latitude, longitude)


                   ..... OR ....


        ! Send as many row/col pairs as desired.
        ! Row and Column values are INTEGER*4 (or longs) and
        ! are passed by reference.

              call LL_MAXMIN_SEND_RC (row, col)
```

```
      END LOOP

 ! This is the final subroutine and MUST be called last.  It
 ! returns the minimum and maximum coordinates (latitude and
 ! longitude) from all of the pairs passed to LL_MAXMIN_SEND
 ! or to LL_MAXMIN_SEND_RC.
 ! Normal minimum and maximum values are used when the pairs
 ! have been determined to ONLY cross 0 degrees longitude.
 ! However, when the set crosses 180 degrees, or both 0 and 180
 ! degrees, the least positive and least negative longitude
 ! coordinates are used for the maximum longitude and minimum
 ! longitude values, respectively.
 ! Latitude and Longitude are REAL*8 (or DOUBLE) and are passed
 ! by reference.

      call LL_MAXMIN_RET (minlon, maxlon, minlat, maxlat)


2 MAP_DIR_PROCS.C

 MAP_DIR_PROCS.C contains a suite of C language routines that
 perform a variety of operations on a MAP directory.  Subtopics
 include requirements, individual routines within the suite
 and subroutines that are external to the suite.

3 External_Subroutines
   The following external routines are required for linking:

            GET_PA_DIR.FOR: Gets the PA directory name
            GETPID_ASC.FOR: Gets the process' system ID number.
          CHART_STATUS.FOR: Reads the CHART_STATUS file.
 SEND_TO_MDFF_CONSOLE.MAR: Send messages to display on the MDFF
                           operator console(s).
              FINDZONE.FOR: Determines which TS zone the data are
                           in.

3 Requirements
 The following subtopics describe items that are required by
 the routine suite.

4 Arrays
 Some routines require array variables - the array names and a
 list of their elements include:

 Array COORD[4] defines an area by 2 corners in latitude/longitude
 where:
      COORD[0] = southwest lat;
      COORD[1] = southwest lon;
      COORD[2] = northeast lat;
      COORD[3] = northeast lon;

 Array CORNERS[4] defines an area by 2 corners in row/column
```

```
where:
      CORNERS[0] = southwest row;
      CORNERS[1] = southwest col;
      CORNERS[2] = northeast row;
      CORNERS[3] = northeast col;

Array LIMITS[2] defines upper and lower boundary expressed in
latitude where:
      LIMITS[0] = bottom lat;
      LIMITS[1] = top lat;

4 Include_Files
The file "V2_DIR:MAP_DIR_PROCS.H" contains data definitions used
by the routines and must be included in the source code.

4 Global_Variables
Global variables, which are to be declared external (i.e.,
extern), include the following:

          long   COL_LIMIT;  Number of columns in a given zone

          double LIMITS[2];  Described above

   double TOP_LAT, BOT_LAT;  Top and bottom latitudes of a zone

        char FORM[MAX_LEN];  Form = "CHART_SEGMENTS" for DS Data
                             Form = "MAP" for COMPRESSED Data

  char TRIMMED_DIR[MAX_LEN]; Trimmed Directory name

3 Suite_Descriptions

Individual routines are described as subtopics.

4 BUILD_STRUCT
  void BUILD_STRUCT (long row, long col, struct coord ITEM [], long
                     *count);
       Is passed a row and a column and places them into the
       structure COORD.

4 CAL_ZONE_COVERAGE
  double CAL_ZONE_COVERAGE (long zone, long scale);

       Is passed the zone and scale.

       The global array LIMITS[2], is filled with the upper and
       lower latitude values for that zone.

       Returns the column width in segments, COL_LIMIT.

4 CORNER_IN_BOUNDS
  long CORNER_IN_BOUNDS (long zone, long scale, long row, long col,
```

```
                                double coord[]);
```

Is passed the zone, scale, row/column to be tested and bounds.

Returns TRUE if the segment is within bounds
FALSE if the segment is not within bounds.

```
4 DECIDE_TO_DEL_NONPOLAR
  long DECIDE_TO_DEL_NONPOLAR (long corners[], long row, long col);
```

Is passed row/column values and determines whether or not the nonpolar segment should be deleted.

Returns TRUE if the segment should be deleted
FALSE if the segment should not be deleted

```
4 DECIDE_TO_DEL_POLAR
  long DECIDE_TO_DEL_POLAR (long zone, long scale, long row,
                            long col, double coord[]);
```

Is passed the zone, scale, row/column to be tested, and bounds.

Returns TRUE if the segment is within polar bounds
FALSE if the segment is not within polar bounds.

```
4 DELETE_DIR
  void DELETE_DIR (char *buffer);
```

Sets the protection level of a file to DELETE and then deletes it.

```
4 DEL_OR_SAVE_SEGMENT
  long DEL_OR_SAVE_SEGMENT (long zone, long scale, long row,
                            long col,long corners[], double
                            coord[]);
```

Calls functions to determine whether or not a segment should be deleted.

Returns TRUE if the segment should be deleted
FALSE if the segment should not be deleted

```
4 DETERMINE_BOUNDS
  long DETERMINE_BOUNDS (double coord[]);
```

Adjusts the array COORD to take into account zone overlap.

Returns TRUE if COORD was modified.

FALSE if COORD was not modified.

4 ELIMINATE
```
void ELIMINATE (char *path, char *eliminate);
```

When passed a path name, eliminates the substring *eliminate.

4 GET_CORNERS
```
void GET_CORNERS (long scale, long zone, long *corners, double
                  *coord);]
```

Is passed a chart scale, zone, and coordinates.

Returns row/column corners for the segment.

4 GET_CS_TRIMMED_DIR
```
long GET_CS_TRIMMED_DIR ();
```

Gets the COMPRESSED data trimmed directory name from the processing thread and stores it in the global variable, TRIMMED_DIR.

4 GET_DS_DIR
```
long GET_DS_DIR (char fname[]);
```

Finds the MAP Directory of the current processing thread, extracts the scale, and returns a path name to the map directory as fname.

4 GET_DS_TRIMMED_DIR
```
long GET_DS_TRIMMED_DIR ();
```

Gets the DS data trimmed directory name from the processing thread and stores it in the global variable, TRIMMED_DIR.

4 GET_KEY_FROM_DS_FILENAME
```
long GET_KEY_FROM_DS_FILENAME (struct dsc$descriptor_s fname,
                               long *zone);
```

Is passed a downsampled segment file name, as fname, and zone.

Extracts and returns the segment file's key name.

4 GET_KEY_FROM_FNAME
```
long GET_KEY_FROM_FNAME (struct dsc$descriptor_s fname);
```

Is passed a key name as fname.
Returns the key fname as (converted to) a ten digit integer.

```
4 GET_LOGICAL_NAME
  long GET_LOGICAL_NAME (char *logical, char *resultant);

       Is passed a logical name and returns its equivalence.

       Returns  TRUE if an equivalence is found
                FALSE if an equivalence is not found

4 GET_MAP_DIR
  long GET_MAP_DIR (char fname[]);

       Finds the MAP Directory of the current processing thread,
       extracts the scale, and returns a path name to the map
       directory.

4 GET_PA_NUM
  long GET_PA_NUM (char *string);

       Extracts a PA number for a PA directory.

4 GET_ROW_FROM_FNAME
  long GET_ROW_FROM_FNAME (struct dsc$descriptor_s);

       When passed a row name as FNAME, the row name is
       converted to a six digit integer and returned.

       When the six digit row number begins with a 1,
       the 1 is dropped and the row number is made negative.

       A value of 999999 is returned when the fname is not
       a row fname.

4 LATLON_IN_CORNER
  long LATLON_IN_CORNER (long scale, long zone, long row, long col,
                         double lat, double lon);

      Is passed the scale, zone, row/column to be tested,
      and the lat/lon of a corner.

      Returns  TRUE if the segment is a corner
               FALSE if the segment is not a corner


4 MAKE_DIR_FILE
  void MAKE_DIR_FILE (char *buffer);

       Is passed a string containing a file name in the form
       (example) CHART_ODI_DISK:[MAP3.PA013001.R000000]TEMP.DOC;

       The ']' bracket is removed and replaced with '.DIR'
       to form a directory file name.
```

The last '.' period is replaced with a ']' bracket before the new directory file name.

The final result is

CHART_ODI_DISK:[MAP3.PA013001]R000000.DIR;

4 MAKE_FILE_DIR

```
struct dsc$descriptor_s MAKE_FILE_DIR (struct dsc$descriptor_s);
```

Is passed a string descriptor containing a file name in the form CHART_ODI_DISK:[MAP3.PA013001]R000000.DIR;1

The end ']' bracket is removed and replaced with a '.' period.

The last '.' period is replaced with an end bracket, the extension and version numbers are removed.

The new file name descriptor and its length are returned.

2 QAL_MAXMIN.C

Contains a suite of routines that determine the true minimum and maximum latitude and longitude coordinates of ADRG data on a CD from the ADRG QAL file (see the DMA ADRG product specification for additional information about the QAL file).

QAL_MAXMIN.C contains two subroutines. In order to work correctly, both routines must be invoked in the proper sequence.

3 QAL_MAXMIN_INIT

Initializes variables that are used by the routine QAL_MAXMIN_RET. Hence, it must be invoked first. The following syntax is used to invoke qal_maxmin_init:

```
qal_maxmin_init (&scale, &zone)
```

where

scale	contains the chart scale (long, passed by reference)
zone	contains the TS zone (long, passed by reference)

3 QAL_MAXMIN_RET

Returns the minimum and maximum latitude and longitude values for the data that have been determined from the QAL file on the CD. This routine MUST be invoked last. The following syntax is used to invoke qal_maxmin_ret:

```
qal_maxmin_ret (&minlon, &maxlon, &minlat, &maxlat)
```

where

minlon, maxlon	Contain minimum and maximum longitude coordinates (double, passed by reference)
minlat, maxlat	Contain minimum and maximum latitude coordinates (double, passed by reference)

3 Example

The following FORTRAN code segment provides an example of proper usage of QAL_MAXMIN.C:

```
C*** Variable declarations ****
             real*8    minlat, maxlat, minlon ,maxlon ! Contains
the
                                                      !coordinates
          integer*4    zone/0/, scale/5/
       character*(80)  filename   ! Contains the full QAL file name

     filename = 'CDROM06:[ONA50101]ONA50101.QAL' // char(0)

C**** Note that FORTRAN, by default, ****
C**** passes arguments by reference   ****
      call qal_maxmin_init (scale, zone, %ref(filename))
      call qal_maxmin_ret  (minlon, maxlon, maxlat, minlat)
      print (6,*) minlon, maxlon, maxlat, minlat
```

2 QUAD_PROCS.C

A suite of C language routines that compute minimum and maximum latitude/longitude coordinates for polar map data. These functions are designed for use with polar data and will not effect nonpolar data. When the minimum and maximum latitude/longitude values of a polar region are constant (i.e., if this region was translated to a nonpolar representation, its shape would be rectangular), special measures must be taken to find the true minimum and maximum row and column values of the data contained within this region.

As a latitude/longitude point changes its latitude position in the polar region, it traces to an arc configuration. Conversely, as the point changes its longitude position, it traces a perfect circle. The point at which this circle crosses the polar quadrant axis (0, 90, -90, 180) is where the maximum or minimum row/column values lie. Thus, if a region is reduced to the quadrants it crosses, the true minimum and maximum row/column values can be computed.

These routines break a polar rectangular area into smaller areas that are bounded by quadrants (defined in terms of latitude/longitude). Subtopics include requirements, individual

routines within the suite, and an example of usage.

3 Requirements
The following files must be included for use with QUAD_PROCS.C:

V2_DIR:QUAD.H	Contains data definitions used by the subroutines.
V2_DIR:DATA_DEFS.H	Contains type definition for common variables (e.g., scale, zone)

The following subroutines are required for linkage. For additional information about each subroutine, see MDFFHELP under the main topic CAC_SOURCE_CODE.

LL_MAXMIN.C	A suite of routines that determine the true pair of minimum and maximum latitude and longitude coordinates.
RC_MAXMIN.C	A suite of routines that determine the true pair of minimum and maximum row/column pairs.

3 QUADRANT_LONGITUDE_BOUNDS
Passes in the starting longitude and the ending longitude values of a region and should be called before functions QUADRANT_LONGITUDE_RET and QUADRANT_LONGITUDE_NEXT are invoked. The following syntax is used to invoke QUADRANT_LONGITUDE_BOUNDS:

```
void quadrant_longitude_bounds  (LON *left, LON *right)
```

where

left	Contains a starting longitude coordinate (passed)
right	Contains an ending longitude coordinate (passed)

3 QUADRANT_LONGITUDE_RET
When iteratively called until returning a FALSE value, this routine returns all quadrants that lie within the initial longitude bounds that were passed to QUADRANT_LONGITUDE_BOUNDS. The following syntax is used to invoke QUADRANT_LONGITUDE_RET:

```
BOOLEAN quadrant_longitude_ret  (LON *left, LON *right)
```

where

a BOOLEAN value returns	TRUE if a new longitude quadrant is found. Otherwise, returns FALSE
left	Contains a starting longitude coordinate (double, passed)
right	Contains an ending longitude coordinate (double, passed)

3 QUADRANT_LONGITUDE_NEXT
Sets up the longitude values for the next call to

QUADRANT_LONGITUDE_RET. This function must be called last. The following syntax is used to invoke QUADRANT_LONGITUDE_NEXT:

```
void quadrant_longitude_next (LON *left, LON *right)
```

where

left — Contains a starting longitude coordinate (double, passed)

right — Contains an ending longitude coordinate (double, passed)

3 Example

The following code segment, which prints the coordinate values -90, -180, 180, 90, provides an example of usage:

```
left_lon  = -90;   /* stating longitude coordinate */
right_lon =  90;   /* ending  longitude coordinate */

/* Establish starting and ending longitude coordinates */
quadrant_longitude_bounds (&left_lon, &right_lon);

/* Obtain quadrants containing map data */

while (quadrant_longitude_ret (&left_lon, &right_lon))
    {
     printf ("%lf %lf\n", left_lon, right_lon);
     /* Establish next coordinates to be used */
     quadrant_longitude_next (&left_lon, &right_lon);
    }
```

2 RC_MAXMIN.C

RC_MAXMIN.C, written in C language, contains routines that determine the true pair of minimum and maximum row/column values from a set of row/column pairs. RC_MAXMIN.C determines if the row/column values transition 180 or 0 degrees and adjusts the minimum and maximum row/column values accordingly.

3 Routines

RC_MAXMIN.C consists of three routines:

RC_MAXMIN_INIT: Initializes variables used by the next two calls. This routine MUST be called first.

RC_MAXMIN_SEND: Repeat for each row/column pair within the set.

RC_MAXMIN_RET: The final routine and MUST be called last. It returns the minimum and maximum row and column values for all of the pairs passed to RC_MAXMIN_SEND.

In order to work correctly, all three routines must be invoked in proper sequence. The Example subtopic shows proper usage.

3 Example
The following example uses pseudocode to show proper usage of RC_MAXMIN.C and its associated routines.

```
call RC_MAXMIN_INIT ()  ! Initialize variables used by the
                        ! next two calls.  This routine MUST be
                        ! called first.

! Loop - repeat for each row/column pair within the set.

        LOOP 1 TO Number_Of_ROW_COLS

           ! Send in as many row/col values as you like.
           ! Row and Col are INTEGER*4 (LONG) and
           ! are passed by reference.

           call RC_MAXMIN_SEND (row, col)

        END LOOP

! This is the final routine and MUST be called last.  It returns
! the minimum and maximum row/column values from the set of
! row/column pairs passed to RC_MAXMIN_SEND.  Normal minimum and
! maximum values are used when the set has been determined to ONLY
! cross 0 degrees longitude.  However, when the set crosses 180, or
! both 0 and 180 degrees, the least positive and least negative
! column values are used for the maximum column and minimum column
! values, respectively.  Values are passed by reference

call RC_MAXMIN_RET (mincol, maxcol, minrow, maxrow)
```

2 SEND_MAIL.FOR
Provides an interface to the VAX/VMS MAIL utility. This routine can only be invoked from VAX/VMS FORTRAN due to the passing of character strings using descriptors. The SEND_MAIL_C routine can be used to send VAX/VMS mail from a "C" language routine.

No include files required for calling. However, this routine is VAX/VMS dependent.

3 Invocation
The following syntax is used to invoke SEND_MAIL:

```
    call SEND_MAIL (send_to,subject,buffer,lines)
```

where

send_to: VMS username to receive the mail message.
(passed, character*(*))

subject: Subject title.
(passed, character*(*))

buffer: Character string buffer containing the text of the mail message. This buffer may contain several lines of text.
(passed, character*(*) array)

lines: Number of lines contained in "buffer".
(passed, integer*2)

Note: The variable "buffer" may be a single string; in the case of a one line message or it may be a character array. For example, if the declaration "character*80 message_buf(10)" is used with "lines" equal to 10, SEND_MAIL will send a message of 10 lines with 80 characters per line to the VMS username that is specified in "send_to".

2 SEND_MAIL_C.C

Subroutine SEND_MAIL_C sends a VAX/VMS mail message from programs written in C programming language. The subtopic Example shows proper usage.

3 Example
The following pseudocode provides an example of SEND_MAIL_C usage.

```
#include <stdio.h>
#include <string.h>

#define MAX_LINES_OF_MAIL  250  /* Max # of lines in message   */
#define MAX_LINE_LENGTH    250  /* Max # of characters in line */

main ()
 {

 char send_to[MAX_LINE_LENGTH]; /* Name of person(s) to send to */
 char subject[MAX_LINE_LENGTH]; /* Subject of message.          */

 char line_buffer[MAX_LINES_OF_MAIL][MAX_LINE_LENGTH];

 long lines;   /* Number of lines in message */

 strcpy (send_to, "SMITH, JONES");
 strcpy (subject, "TEST OF SEND_MAIL_C");
```

```
/* Insert Message */
strcpy (line_buffer[0], "                                          ");
strcpy (line_buffer[1], " HELLO,                                   ");
strcpy (line_buffer[2], "                                          ");
strcpy (line_buffer[3], "This is a test of send_mail_c.c           ");
strcpy (line_buffer[4], " You can place up to 250 lines            ");
strcpy (line_buffer[5], " in your message and each line            ");
strcpy (line_buffer[6], " can be 250 characters in length.");
strcpy (line_buffer[7], "                                          ");

/* Number of lines in message */
lines = 9;

/* Send Mail */
send_mail_c (send_to, subject, line_buf er, lines);

}
```

2 TIMEM.MAR

This C language routine separates one quadword into two longwords using the following protocol:

* is passed a VAX time string and its length

* builds a string descriptor

* calls BINTIM_S (a VAX system macro) which returns a quadword. The quadword contains the number of seconds (in 100 nanoseconds) since 17-NOV-1858 00:00:00.00.

* converts this quadword into two (more manageable) longwords.

3 Example

The following example uses C-based pseudocode to show proper use of TIMEM.MAR

```
long one;      /* first long word, returned argument */
long two;      /* second long word, returned */

long length;   /* length of the character string TIMESTR */
               /* passed argument                        */

               /* VAX ti  string, passed argument        */
char timestr[VAX_TIME_ x_LEN] = "12 AUG 1991 12:00:00";


length = strlen (timestr);

/* Get quadword and return as two longwords */
TIMEM (&two, &one, timestr, length);
```

2 USE_ADRG_LOGICALS.FOR

Inserts the specified processing thread's logical name table into the LNM$FILE_DEV logical name search path. The routine uses the FORTRAN "common" block variables PROCESSING_CODE and PROCCODELEN in the LOGICALS.INC file.

3 Invocation

The following syntax is used to invoke USE_ADRG_LOGICALS:

```
call USE_ADRG_LOGICALS
```

No parameters are passed. This routine uses the FORTRAN "common" block variables PROCESSING_CODE and PROCCODELEN that are located in the LOGICALS.INC file.

3 Required_Logicals

It is assumed that the LNM$FILE_DEV logical name equivalence before modification is as follows:

```
LNM$PROCESS
MDFF
LNM$IIS_FILE_DEV
LNM$JOB
LNM$GROUP
LNM$SYSTEM
DECW$LOGICAL_NAMES
```

This routine inserts the logical name table, specified by PROCESSING_CODE and PROCCODELEN, before the LNM$PROCESS logical name. This causes any processing thread definitions to be found first. The include file LOGICALS.INC is required for invocation.

APPENDIX G
TOPIC FILE CNC_PROCESSING.HLP

TOPIC FILE: CNC_PROCESSING.HLP

1 CNC_Processing

This covers the processing of COMPRESSED NAUTICAL CHART (CNC) data. Since both the CAC and the CNC have the same source data format, ADRG, their processing steps are very similar.

See the CNC_Specifics topic for CNC specific information.

2 CNC_Specifics

---------- TO BE ADDED LATER ----------
Put items that differ from CAC processing HERE.

APPENDIX H
TOPIC FILE DEFINITIONS.HLP

TOPIC FILE: DEFINITIONS.HLP

The following text and subtopics appear when **Definitions** is selected as an **MDFFHELP** subtopic:

```
Definitions

 The following topics are definitions for terms used in the
 MDFF.

  Additional information available:

  Chart_Updating_Manual Color_Compression     Compression
  CORE_Segments         Datum     Dither_Pattern
  Downsample            EDGE_Segments
  Ellipsoid  FILLED_Segments      Logical_CDROM_Sector  Micron
  Neatlines  Pixel      Processing_Thread
  Row_and_Column_Coordinates     Segment   Spatial_Compression
  Template   TS_System_Coordinates      UNFILLED_Segments
  Vector_Quantization
```

The following text comprises this **MDFFHELP** topic file. Note that subtopics begin with the key "2", which is located in column 1.

1 Definitions
    The following topics are definitions for terms used in the MDFF.

2 Chart_Updating_Manual
    Chart Updating Manual (CHUM), the Defense Mapping Agency Aeronautical CHUM is a semiannual publication, with monthly supplements, that provides textual and/or graphic additions, deletions, or modifications of cartographic data to published aeronautical charts. Changes appearing in the CHUM are generally considered to be critical to flight safety.

2 Color_Compression
    The second phase of creating Compressed Aeronautical Charts, after transformation from ARC to Tesselated Spheroid, which reduces storage requirements by a factor of 3:1. Color compression is achieved by subjecting the image data to a vector quantization process that selects the closest match of 240 entries in a color palette to represent each pixel.

2 Compression
    A reduction in the amount of space required to store a given set of data. The MDFF compresses Arc Digitized Raster Graphics to Compressed Aeronautical Chart by a factor of 48:1 in three

steps:

(1) Downsampling data from ARC to TS, which reduces resolution of data by four to one (from 256 pixels per inch to 128 pixels per inch).

(2) Color compressing data by three to one (from 24- to 8-bits per pixel).

(3) Spatially compressing data by four to one (from four 8-bit pixel groups to one 8-bit codeword).

2 CORE_Segments

A PASS1 processing term used to identify all full Tesselated Spheroid segments for a given ARC Digitized Raster Graphics CD-ROM.

2 Datum

There are two types of DATUM; horizontal and vertical. Both descriptions are provided.

Datum (horizontal)- The horizontal geodetic datum is uniquely defined by five quantities. Three of these, latitude(phi), longitude(lambda), and geoid height (N) are defined at the datum origin. The adoption of specific values for the geodetic latitude and longitude implies specific deflections of the vertical at the origin. A geodetic azimuth is often cited as a datum parameter, but the azimuth and longitude are precisely related by the Laplace condition so there is no need to define both. There are two other quantities that define the reference ellipsoid: the semimajor axis and flattening or the semimajor axis and semiminor axis.

Datum (vertical)- A level surface to which elevations are referred, usually mean sea level, but may also include mean low water, mean lower low water, or an arbitrary starting elevation(s).

2 Dither_Pattern

A matrix, utilizing fill patterns, that creates the illusion of intensity and color. Dither patterns vary from one another by how the matrix is filled.

2 Downsample

A term used to describe the process by which ARC Digitized Raster Graphics is transformed into Tesselated Spheroid. Downsampling produces a 4:1 reduction in the size of the data by decreasing data resolution from 256 to 128 pixels per inch (approximately, averages the values of four ARC Digitized Raster Graphics pixels to form one Tesselated Spheroid pixel).

2 EDGE_Segments

A PASS1 processing term used to identify all partially filled

Tesselated Spheroid segments for a given ARC Digitized Raster Graphics CD-ROM.

2 Ellipsoid
A surface whose plane sections (cross sections) are all ellipses or circles, or the solid enclosed by such a surface.

2 FILLED_Segments
A PASS3 processing term used to identify previous edge segments from PASS1, which have been merged with other edge segments to form a full segment.

2 Logical_CDROM_Sector
The smallest addressable block of data (2048 bytes) on an ISO 9660 CD-ROM.

2 Micron
A unit of measure; one millionth of a meter.

2 Neatlines
The lines that bound the body of a map, usually parallels and meridians, but may be conventional or arbitrary grid lines. Also called sheet lines.

2 Pixel
A pixel, or picture element, is the smallest entity in a raster graphic image.

2 Processing_Thread
A three letter code used to identify an MDFF processing build. Processing threads are only used internally within the MDFF. The first character distinguishes the data set type [(A)-CAC, (N)-CNC, (D)-DLMS, etc.]; the second letter identifies the scale of the data set [(0)-1:50K, (1)-1:100K, (2)-1:250K,etc.]; the third letter is a sequence identifier [(A)- first, (B)-second, etc.]

2 Row_and_Column_Co .dinates
In Tesselated Spheroid, segments are arranged by latitudinally based rows and longitudinally based columns within the equatorial and temperate zones. Row 0 is located with its southern boundary on the equator. Positively numbered rows extend northward from row 0 in the northern hemisphere, and negatively numbered rows extend southward from row -1 in the southern hemisphere.

The first column of segments in each nonpolar zone (column 0) is located with its western boundary on the 0 degrees meridian. Positive columns extend eastward from column 0 and stop at the 180 degrees meridian. Negative columns extend westward from column 0 and stop at the 180 degrees meridian.

Within a single CAC segment, rows of pixels are numbered from bottom (row 0) to top (row 255). Columns of pixels are numbered from left (column 0) to right (column 255).

2 Segment
An array of 256 rows with 256 pixels each, stored in band sequential form. Equivalent to approximately two square inches of paper chart.

2 Spatial_Compression
The third phase of processing CACs, which reduces storage requirements by a factor of 4:1. Spatial compression is achieved by applying a vector quantization process that first classifies the image and then replaces each 2 by 2 pixel block in the image with a coded entry from a 256-entry lookup table.

2 Template
A definition file applied here to MDFF mapstations, used to define a coverage of a given area at a given scale. The template may then be used to transfer data from a CAC to an aircraft optical disc.

2 TS_System_Coordinates
In the nonpolar zones, Tesselated Spheroid coordinates are the WGS 84 phi and lambda under the equirectangular projection. In the polar zones, Tesselated Spheroid coordinates are created by rotating the polar coordinates to the equatorial zone, in the equirectangular projection.

2 UNFILLED_Segments
A PASS3 processing term used to identify previous edge segments from PASS1 which, after merging, are still unfilled.

2 Vector_Quantization
Vector_Quantization, used by the MDFF applies the "lossy" compression method to both color and spatially compress ARC Digitized Raster Graphics data. Uses a training set of data to predict colors and pixel patterns over a larger set of data.

APPENDIX I
TOPIC FILE DLMS_PROCESSING.HLP

TOPIC FILE: DLMS_PROCESSING.HLP

1 DLMS_Processing

This topic will cover the processing of Digital Land Mass System (DLMS) data.

---------- TO BE ADDED LATER ----------

APPENDIX J
TOPIC FILE HINTS.HLP

TOPIC FILE: HINTS.HLP

The following text and subtopics appear when **Kints** is selected as an **MDFFHELP** subtopic:

```
HINTS

Type the name of one of the categories listed below to obtain
a list of related commands and topics.  To obtain detailed
information on a topic press RETURN until you reach the
"Topic?" prompt and then type the name of the topic.

 Additional information available:

 Executing_Programs     Program_Development   Logical_Names
 Contacting_People      Directories_and_Files
 Batch_and_Print_Jobs
```

The following text comprises this **MDFFHELP** topic file. Note that subtopics begin with the key "2", which is located in column 1.

```
1 Hints
 Type the name of one of the categories listed below to obtain a
 list of related commands and topics.  To obtain detailed
 information on a topic press RETURN until you reach the "Topic?"
 prompt and then type the name of the topic.

2 Executing_Programs

 The NRL Map Data Formatting Facility utilizes a variety of
 programs that are available for execution. A pseudostandard
 naming convention has been adopted to facilitate finding the
 appropriate program.  This standard requires a program name to be
 descriptive such that it includes the program's purpose and use.
 For example,  DISPLAY_CAC_VWS is a program that displays CAC data
 on a Vax Workstation (VWS) monitor.

 In general, programs that require the use of a specific monitor
 should include the monitor as part of the program name.  For
 example,  DISPLAY_CAC_IVAS is a program which displays CAC data on
 an IVAS monitor.  Programs that display data should have the word
 DISPLAY in the title.

 In order to execute programs, the user must have a processing
 thread assigned to their process.  Processing threads are assigned
 using the following symbol:
```

```
$ ADRGLOGS ###
```

where *###* is the desired processing thread name. Almost all of the programs for the MDFF require that a processing thread be assigned. For more information on processing threads see the topic Processing_Threads under HINTS.

All of the programs for the MDFF should reside in the directory MDFFEXE:. A directory listing of this area will show the names of the executable programs that are available.

In order to execute a specific program the following command should be typed at the $ prompt.

```
$ RUN/NODEB MDFFEXE:Program_Name
```

For more information on specific programs look under the main topic CAC_Program_Descriptions. This topic contains functional descriptions of programs used by the MDFF.

2 Program_Development

Source code for the majority of programs that have been developed at the MDFF is stored in the V2_DIR (i.e., Software Version 2) directory. Programs within the V2_DIR directory should be used as a guide for future program development. Because of their modular nature, some of the subprograms may be utilized as part of new software development.

Files that have an extension of .FOR are written in the FORTRAN programming language, and those with an extension of .C are written in the C programming language.

In addition to source code that resides in the V2_DIR directory, there is a library of routines that is also available for inclusion in programs. This library, named MDFFLIB.OLB, is linked using the same method as any other VAX/VMS object library. This following command will list names of the object modules that are contained within the library:

```
$ LIB/LIST  MDFFLIB.OLB
```

See MDFFHELP main topics CAC_Program_Descriptions for program descriptions and CAC_SOURCE_CODE for subprogram descriptions.

2 Logical_Names

Logical names are used extensively by the MDFF for various purposes. A logical name is a string that represents another, usually longer, string. The main benefit of using logical names is that they are typically used as descriptive strings for physical devices. For example, the logical name CHART_SEGS serves as a descriptive name for the disk storage device DUA12:. Logical names are maintained by VMS and may be translated by using the

following command.

$SHOW LOGICAL abcd

Where abcd is a logical name. For additional information on logical names see the VAX/VMS help.

For additional information on specific logical names see the main MDFFHELP topic Logical_Names.

2 Contacting_People

The MDFF has several methods for contacting people via VAX mail. For information about VAX mail, see the VMS HELP topic MAIL. There are three distribution lists that can be used for sending messages to a certain group of people.

MDFF_PROCESSORS.DIS	Sending a message using this list will contact people who are only involved in the CAC processing.
LOCAL_MDFF.DIS	Sending a message using this list will contact all people who are directly involved in the MDFF.
GLOBAL_MDFF.DIS	Sending a message using this list will contact everyone having an account on one of the MDFF computers.

These distribution lists are located in the MDFFEXE directory.

2 Directories_and_Files

The MDFF uses many different directories and files in the production of a CAC. The directory containing source code and executable images that are used by the MDFF to produce a CAC is named MDFFEXE.

CAC processing involves several formats of chart data (e.g., ADRG, downsampled, and compressed) and other associated files (e.g., command procedures and log files).

The following is a list of major directories and the types of files are contained therein.

[MDFF.XXX.SCRATCH]

Contains all of the command procedures and log files for downsampling and compressing ADRG data. This directory is known as "MDFF_SCRATCH" for a specific processing thread (as noted by "XXX") and is defined by the logical name MDFF_SCRATCH. There are five subdirectories that exist under this directory, descriptions of each follow:

[.CB_REPAIR] Contains all the segments that need to be repaired. Each segment is in a subdirectory for the row that segment is in.

[.CDYXXXXX] Contains the SEGMENTS.DAT file of downsampled segments for the YXXXXX CD-ROM. Note that "Y" designates the Mastering Facility code and "XXXXX" designates the CAC CD-ROM number.

[.CODEBOOKS] Contains all the codebook build procedures that have been used for this CAC.

[.VALIDATE] Contains a copy of the transmittal header file, TRANSH01.THF, that is used in the CD-ROM validation procedure.

[.PAXXXXX] Contains all of the PA (palette) codebook compression procedures.

CHART_SEGS:[MDFF.XXX.CHART_SEGMENTS.]

This is known as the "CHART_SEGMENTS" directory and it contains row subdirectories for every row that is contained within area of the XXX chart ODI build. Each row subdirectory contains the downsampled segment files for that particular row. The logical name CHART_SEGS serves as a descriptive name for the disk storage device.

CHART_ODI:[MDFF.XXX]

The chart ODI directory, contains the structure of the image that will be written onto CAC CD-ROM. The logical name CHART_ODI serves as a descriptive name for the disk storage device. One subdirectory exists:

[.MAPX] The root of the tree structure for a CAC. The chart scale is denoted by the "X". The following subdirectories are associated:

[.CDYXXXXX] This directory and subdirectory tree contains all of the header information for that particular CD-ROM. Note that "Y" designates the Mastering Facility code and "XXXXX" designates the CAC CD-ROM number.

[.PAXXXXXX] This directory contains the COVERAGE.DAT file for that particular PA (i.e., palette), the row directories containing all the compressed segment files, and the color PALETTE.DAT file

2 Batch_and_Print_Jobs

To facilitate an easy data flow through the process of a chart ODI build, the MDFF uses batch queues to manage the scheduling for the reading of ADRG data, downsampling, compression, and print jobs.

The primary queue is named MDFF_BATCH. This queue manages the reading of ADRG CD-ROMs, downsampling, and the building of command procedures. MDFF_BATCH manages every type of activity except for the submission of codebook compression jobs, which are handled by a thread-specific batch queue.

Thread-specific batch queues parcel out codebook compression jobs to one or more generic codebook queues. Each generic codebook queue executes on a separate computer within the MDFF cluster. There are seven generic codebook queues for compression jobs and, depending on the priority of a certain thread, the number of generic queues that are utilized by one particular thread may vary.

APPENDIX K
TOPIC FILE LOGICAL_NAME.HLP

TOPIC FILE: LOGICAL_NAME.HLP

1 Logical_Names

Much of the MDFF functionality is achieved through the use of logical names. Most MDFF logical names are simply descriptive abbreviations of longer strings. For example, V2_DIR is an MDFF logical name that represents the directory name DUA12:[MDFF.SOFTWARE.NOARL.SRC.V2].

Hence, the logical name V2_DIR represents the directory where all the version 2 MDFF software is located. The MDFF uses logical names for almost every aspect of the V2 software including directory designations and queue names.

Use the following command to show current definitions for all existing logical name tables:

```
$ SHOW LOGICAL *
```

The primary use of logical names is to facilitate easier multi-thread processing of CACs. For example, in order to access data (i.e., downsampled data, compressed data, etc.) that have been processed as part of thread A4A, all of the logical names associated with A4A must be set. This is done by using the following symbol:

```
$ ADRGLOGS A4A
```

Use the following command to show current definitions for all logical names associated with processing thread A4A:

```
$ SHOW LOGICAL/TABLE=A4A
```

APPENDIX L
TOPIC FILE MAPSTATION.HLP

TOPIC FILE: MAPSTATION.HLP

The following text and subtopics appear when **Mapstation** is selected as an **MDFFHELP** subtopic:

```
Mapstation

Four mapstations are used in the MDFF to create Aircraft Optical
Disks (AODs) that contain user-selected areas and scales of CAC
data.  NRL's mapstations are 386-based  PCs that have been
specifically designed by Horizons Technology Inc. (HTI) to
permit an operator to select predetermined areas and scales of
CAC data and output this data onto militarized AODs, which are
write-once, read-many (WORM) devices.

This topic provides descriptions of processing procedures.
Familiarity with mapstations and procedures is assumed.

 Additional information available:

 Logging_CAC_CDROMS     Template_Creation      ODI_Transfer
 Save_ODI_to_MO         Miscellaneous          Paper_Charts
```

The following text comprises this **MDFFHELP** topic file. Note that subtopics begin with the key "2", that is located in column 1.

1 Mapstation

Four mapstations are used in the MDFF to create Aircraft Optical Disks (AODs) that contain user-selected areas and scales of CAC data. NRL's mapstations are 386-based PCs that have been specifically designed by Horizons Technology Inc. (HTI) to permit an operator to select predetermined areas and scales of CAC data and output this data onto militarized AODs, which are write-once, read-many (WORM) devices.

This topic provides descriptions of processing procedures. Familiarity with mapstations and procedures is assumed.

2 Logging_CAC_CDROMS

The following procedure is used to add new CAC CD-ROMS into the mapstation database.

A - Select the "IMPORT MEDIA" option from the main menu.

B - Select the "CD-ROM" option from the "IMPORT MEDIA" menu.

C - Insert a CAC CD-ROM into the CD-ROM drive (device J:) and press the RETURN key.

D - Upon completion, note the addition in the appropriate logbook.

2 Template_Creation

Templates are used to define the data being transferred and must be created in order to perform an ODI transfer. Templates include the area of coverage and data characteristics (e.g., scale). The following procedure (steps A through K) is used to create a template:

A - Select "DEFINE ODI" option from the main menu.

NOTE: The coverage area of template definition must be logged into the mapstation database (see topic Logging_CAC_CDROMS).

B - Select the "NEW ODI" option from the "DEFINE ODI" menu.

C - Select the appropriate scale (1:500K is the default scale).

D - The world map will be displayed on the screen. Select the region of the world from which the template will be created by scrolling to the desired location and pressing <RETURN>.

E - The regional map will be displayed. Scroll to the desired area, which will be included in the new template, and press <RETURN>. The limits of available coverage will be outlined in red. The new template must reside within this area of coverage.

F - Select the "ADD COVERAGE" option from the "DEFINE ODI" menu.

G - Move the arrow on the display to a corner of the area to be defined by the template and press <RETURN>. H - Scroll the arrow until the desired coverage for the template is enclosed by a box and press <RETURN>. If more areas need to be defined, repeat steps G and H. When finished defining an ODI, press <ESC>.

NOTE: If coverage is to be deleted: select the "DELETE COVERAGE" option from the "DEFINE ODI" menu, place the arrow within the box to be deleted and press <RETURN>.

I - Select the "ESTIMATE SIZE" option to determine the size of the template coverage.

NOTE: The maximum size of an ODI subdirectory is 80 sectors. The maximum number of subdirectories per zone per scale is three.

J - Select the "VIEW AREA" option from the "DEFINE ODI" menu and view data that are within the template area for the defined scale and zone(s). If colors are incorrect, verify that the proper palettes (*.PAL and *.AOD) are on the fixed disk.

K - Once steps I and J are completed, select the "SAVE ODI" option from the "DEFINE ODI" menu and name the template.

2 ODI_Transfer

In order to perform ODI transfers, the palettes for template coverage must be located on the fixed disk and in directory C:\PALETTES

The following procedure (steps A through F) is used to transfer an ODI.

A - Select the "TRANSFER ODI" option from the main menu.

B - Select output media from the "TRANSFER ODI" menu: the "AIRCRAFT DISK" option for WORM media , or the "OPSTA ODI" option for MO media.

NOTE: An ODI image file can also be written to the fixed disk

by selecting "AIRCRAFT DISK" option and leaving the DMU turned off. This enables individual ODI builds to be saved, merged, and transferred (after quality assurance is performed

on the image on fixed disk) before writing a WORM (see the topic Save_ODI_to_MO)

C - If writing onto WORM media, clean the disk before mounting it

into the DMU.

NOTE: Make sure write-protection is off. Initially, write protection is on.

D - If writing onto WORM media, turn DMU power on.

E - Select the template to be transferred.

F - Insert any media that is prompted by the software (such as a specific CAC CD-ROM).

2 Save_ODI_to_MO

Optical Disk Image (ODI) generation can require a significant amount of time and effort. Therefore, once an ODI has been created, it is usually saved by transferring it from fixed disk (drive E:) onto Magneto-Optical (MO) disk.

The following procedure (steps A through K) is used to merge individual ODI builds to a single ODI and then copy that ODI onto an Aircraft Optical Disk (AOD).

A - Turn on the mapstation and change to the default current directory on the fixed disk (drive E:) by typing E:

B - Put the MO into the F: drive and type DIR F: to display the list of ODI filenames.

C - Delete any old ODI files and ODIHEAD.TEX files that are on the E: drive.

D - Type LOCK.

E - Copy an ODI from drive F: to E:ACOD.ODI
The file name ACOD is derived from Aircraft Optical Disk.

F - Type UNLOCK.

G - Construct an ODI image from individual ODI builds by executing the program C:\HTI_UTILS\ADDSUB xx. This program will merge subdirectory xx from the ACOD.ODI file on E: drive into an ACOD.OUT file.

H - Repeat steps D through G until all ODI files on F: have been merged.

I - Upon completion of the ODI image build, rename the file ACOD.OUT to ACOD.ODI. Make a backup copy of ACOD.ODI onto a MO with the following DOS command:

COPY E:ACOD.ODI F:filename.ODI

where filename is descriptive of the geographic area.

J - Retain header information that is contained in the EMPTY template by using the DOS copy command to copy the file C:\HTI_UTILS\EMPTY.TEX to the file E:ODIHEAD.TEX.

K - Put the WORM into the Digital Memory Unit (DMU), making sure that it is secured.

L - Change directory to the C: drive, and type MAP to invoke the mapstation software.

M - Select the "TRANSFER ODI" option and then select the "TEMPLATE TO AOD" option.

N - Use the EMPTY template by pressing the ENTER key.

O - The copy will begin.

2 Miscellaneous

The following topics contain informational notes.

3 Drives_Devices

The following drives and devices are available on the mapstations.

Drive	Device
A:	Three and a half inch floppy drive
B:	Three and a half inch floppy drive
C:	Hard disk drive, partitioned with D:
D:	Hard disk drive, partitioned with C:
E:	Hard disk drive
F:	MO drive
J:	CDROM drive

NOTE:
Drives C: and D: are based on a single partitioned hard disk drive. These drives contain system and mapstation software.

Drive E: contains output ODI files, which by mapstation software, will be transferred onto WORM media.

3 Palettes

Original mapstation palettes, provided by HTI, are different from the NRL palettes. On NRL's mapstations (mapstations 2,3,6 and 7), NRL palettes have replaced HTI palettes for the JNC,TPC, and JOG scales in all zones.

HTI naming conventions for mapstation palettes also differ from NRL conventions. HTI mapstation palettes use scale values 1 through 6 where 1 = 1:2M ... 6 = 1:50K. NRL CAC uses scale values 0 through 5 where 0=1:50K and 5=1:2M.

Palettes are located in the directory C:\PALETTES. Palette names use the format PAsz.PAL where "s" indicates scale and "z" indicates zone.

Color tables for each palette use the same prefix but have an .AOD suffix. Hence, color tables use the format PAsz.AOD where "s" indicates scale and "z" indicates zone. The mapstation color table is pixel interleaved (red green blue, red green blue, red green blue...) whereas NRL's color tables are band interleaved (256 red, 256 green, 256 blue). To copy NRL palettes to a mapstation, use the program REPL_PAL

(available on mapstation 3, C: drive).

3 View_Area

Before transferring ODI data to an AOD, verify that the mapstation has the proper palette for the defined transfer area.

Use the VIEW AREA option from the DEFINE ODI menu to identify the transfer palette. Viewing data from the VIEW MEDIA menu can be deceiving because the palette used for viewing from this menu is NOT the palette transferred to the AOD!

3 Size_Requirements

The true maximum size per subdirectory is 80 sectors (this is less than the mapstation ODI TRANSFER limit). Because a sector contains approximately 1 MB, the maximum subdirectory size on a WORM is approximately 80 MB.

The total amount of data that can fit onto WORM media is 260 MB. However, the size of the ODI file on fixed disk may be larger.

2 Paper_Charts

Paper charts may be scanned, processed and added to the mapstation database.

3 Scanning

JOG paper charts normally require about 12 scans each. The chart must be folded and laid face down in the upper-left corner of the scanner (view from front) in a horizontal direction. The folds in the chart should be as straight as possible with the scan containing at least nine easily definable

points (control points for warping).

Occasionally, a dark piece of paper may need to be placed over the portion of chart being scanned because colors from the reverse side of the chart may be seen in the scan.

After all the scans for a chart have been completed, copy the scanned files onto a MO (using the DOS copy command). The scanned files are located in scale-specific directories. For example, when using JOG data, scanned files are located in directory D:/1-250K/. After three or so charts, some of these scanned image files must be deleted from the fixed disk to make room for additional scanned image files.

3 Processing

The following procedure (steps A through K) is used to process scanned charts.

A - Using scanned image files from a MO, use the following DOC command to copy all files to drive and directory D:/1-250K/

COPY F:*.SC D:/1-250K/*.*

B - Type MAP to invoke the mapstation software.

C - Select the "PROCESS CHARTS" option, followed by the "SELECT IMAGE" option, and chose one of the scanned images that has just been copied.

D - Select the "CONTROL POINTS option followed by the "ADD/MODIFY" option to add the control points to the image. Usually, GEODETIC system coordinates are the easiest to use, unless the image does not contain three longitudinal lines. In the case of having only two longitudinal lines, it may be easier to use the Universal Transverse Mercator (UTM) system. The UTM system is selected by pressing the space bar.

E - If the GEODETIC system is selected, enter nine sets of latitude/longitude coordinates. These coordinates are used as control points. If the UTM system is selected, refer to the paper chart to obtain the required nine UTM coordinates. A blue box is located at the bottom of the paper chart that indicates now to use UTM coordinate system.

F - For the last selection (coordinates) look for the blue two-letter symbol (inclusive of the points you want to select). The number will first be read vertically then it will be read horizontally. For example, if the number "9" is on the vertical line and "3" is on the horizontal line, on which you're picking your control point within the box ST, the resulting coordinate would be ST 900300.

G - Once all nine control points have been selected and ALIGNED, select the "PROCESS IMAGE" option. This will warp the image and take about three to five minutes to complete. Save the warped image. Repeat steps C through H

until all scanned images have been warped.

H - Exit the mapstation software. Save the warped image files by using the following DOS command to copy files *.WP1 onto MO media (which is contained on F: drive):

COPY *.WP1 F:*.*

Warped images are stored in the same directory as scanned images.

NOTE: It is extremely important to perform the save operation before scanned image processing is continued. The warped files are needed to log the data files into the other

mapstations.

I - Once the warped images have been saved, invoke the mapstation software by typing, at the DOS level, MAP. Select the "PROCESS CHARTS" option, then select the "LOG IMAGES" option. This step will log the scanned image files into the workstation database. After this step has completed, warped images are automatically deleted from the disk.

J - The last step involves reviewing the logged in scanned data. This is done by going into the "DEFINE ODI" menu, and selecting the "NEW ODI" option, the appropriate scale, and the "VIEW AREA" option. This review will alert you to any gaps, missing segments, or serious alignment problems that may have occurred. Use this same procedure to perform appropriate repairs.

APPENDIX M
TOPIC FILE PROCESSING_THREAD.HLP

TOPIC FILE: PROCESSING_THREAD.HLP

1 Processing_Threads

Processing threads allow the MDFF to process more than one CAC at a time. This enables greater flexibility and a higher CAC production rate. The names of processing threads are descriptive; all thread names are three characters in length with each character having the following meanings:

Example: A4A

A: Type of charts being compressed
- A - Aeronautical
- N - Nautical
- T - Test

4: Scale of the charts being compressed
- 0 - TLM (1:50K scale, TLM50)
- 1 - XXX (1:100K scale, TLM100)
- 2 - JOG (1:250K scale)
- 3 - TPC (1:500K scale)
- 4 - ONC (1:M scale)
- 5 - JNC (2:M scale)
- etc.

A: Is used to delineate simultaneous chart ODI builds, when both charts are at the same scale.

1 Symbols

A symbol defines a symbolic name for a character string or integer value. The MDFF uses symbols as descriptive abbreviations for VMS commands. MDFF symbols are declared globally; hence, they are available to all users. The following command may be used to list existing symbols (note, user-defined symbols will also be included).

```
$ SHOW SYMBOL *
```

Examples of MDFF symbols and their translated meaning include:

MOUNT_CDROM translates to the command @MDFFEXE:MOUNT_CDROM
ADRGLOGS translates to the command @MDFFEXE:USE_ADRG_LOGICALS

APPENDIX N
TOPIC FILE SYMBOLS.HLP

TOPIC FILE: SYMBOLS.HLP

1 Symbols
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